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Historicizing the Biological: Physical Data, Disease History and New World Aboriginal Peoples

by

Shelly Lee Katherine Funston

A thesis submitted to the Faculty of Graduate Studies and Research in partial fulfillment of the requirements for the degree of Master of Arts

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R.G. Collingwood on obscure topics:

Their obscurity is a challenge; you will have to invent new methods for studying them, and then you will probably find that the cause of their obscurity is some defects in the methods hitherto used. When these defects have been removed, it will be possible to revise the generally accepted opinions ... and to correct the errors with which those opinions are perhaps infected. In this sense, knowledge advances not 'from the known to the unknown', but from the 'unknown' to the 'known'.

An Autobiography (London: Oxford University Press, 1939), pg. 86.

University of Alberta

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled *Historicizing the Biological: Physical Data, Disease History and New World Aboriginal Peoples* submitted by Shelly L.K. Funston in partial fulfillment of the requirements for the degree of Master of Arts in History.

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To Dr. John Foster - *The scholar who showed an archaeologist the joy of history*

Abstract

Disease has been, and continues to be, a major factor in the political, economic and social realities of human populations. The field of Disease History is significantly different from that of medical history, and requires the historian to utilize non-traditional data sets to comprehend fully the biological realties of disease. In this way, the political, economic and social impacts of disease can be better understood.

Using the case study of the disease history of New World aboriginal peoples, this thesis will show how the use of physical data will strengthen the historian's ability to understand disease as a biological reality. The use of physical data will ultimately assist the historian to create a better history of disease in pre-contact societies, and to place later introduced diseases within their proper contexts.

Acknowledgements

Without the excellent guidance of Dr. Julian Martin, this thesis could not have been completed. It is one thing to have an advisor, and quite another to work with someone who is genuinely enthusiastic about your topic - it has motivating powers beyond belief. A heartfelt thanks to my examining committee for making my defense tough, but not overwhelming. To the staff of the Department of History and Classics, thank you for opening your doors to an archaeology undergrad, and for your encouragement and patience during my many 'side-trips' into the working world of archaeology and public history. Yes, the thesis took five years, but the experience I gained in the 'outside world' has made me a better historian. A special tribute is paid to the administrative staff of this department who, through their many kindnesses, have made it a wonderful place to work.

From the Provincial Museum of Alberta, a bouquet of potsherds to Dr. Heinz Pyszczyk for being a valuable mentor in the field of archaeology, as well as a good friend. It was through the good graces of Dr. Pyszczyk that I was able to conduct field studies in support of this thesis. The lab work for this thesis would not have been possible without the assistance of Dr. Alwynne Beaudoin. She generously provided the lab space, materials, advice and good humour to see it through. Additionally, the identification of specimens and technical advice was provided by Dr. Alan Shostak of the University of Alberta, Department of Biological Sciences. Without the assistance of these three individuals, I would still be staring blankly at a bag of dirt.

On a personal level, I am deeply indebted to my colleague and friend Celeste Josephine Urion for keeping me on track (and letting me vent) To my Mom, I'm sorry there aren't more pictures, but I'm sure you'll enjoy it anyway. A glass of sherry might help you there. And, to Carey ... Ultimately, if it weren't for your persistence, this would never have been completed. How can I ever thank you for your continued motivation and for your patience with my fits and glares when you would gently ask "*How's the thesis coming along?*".

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Chapter One
A Prescription for Disease History

What is the domain of history? Is it that collection of information found in the documentary record? Does history exclude other data that relates to the past? Oral historians have argued successfully that data other than the written record is a valid form of testimony, yet even this move away from the documentary record leaves the study of history, in practise, limited to the study of *words*. To restrict history to the analysis of the written and spoken word is to constrain historical enquiry artificially. It is not my intention to debate the definition of 'history'. Joyce McKay has argued that defining 'history' is as problematic as defining 'freedom' or 'democracy', and I agree.[1] My work seeks instead to broaden the scope of historical enquiry by showing the need to use physical data in certain fields of study. Historians and archaeologists both seek meaning about the past – it is only their data sources that differ. Historians make their interpretations from words, while archaeologists and physical anthropologists find meaning in the physical remains of past humans and their cultures. These disciplines usually examine different aspects of the past and only rarely are there blending or overlapping of the methods and techniques. Interdisciplinarity does occur: historical archaeologists, when examining post-contact era sites, use documentary data to help interpret features and artifacts. The reverse, however, rarely happens: historians do not generally use physical data to support observations recorded in documents. There remains a need for such interdisciplinary work in order to improve our understanding of many facets of the past. An example of this interdisciplinary work is Disease history, specifically the understanding of disease in New World aboriginal cultures. This thesis demonstrates how the use of biological data, in the form of archaeological and physical anthropological information, may aid the historian in constructing the disease history of New World aboriginal peoples.

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[1] Joyce McKay, "The Coalescence of History and Archaeology" *Historical Archaeology* Vol.10 (1976), p. 93.

The source of disease information most commonly used by historians is documents. Such items can relate symptoms and illness, which is an individual recorder's interpretation of an experience of disease. They often cannot provide reliable data of disease itself. Sometimes only physical evidence, recovered by archaeological or physical anthropological investigations, can do that. But historians remain separated from these fields and from the data used in them. The separation between the disciplines is arbitrary (albeit common enough) and the failure of these disciplines to communicate has impoverished our knowledge of the disease history of aboriginal peoples. To address disease history adequately, a reconciliation of the disciplines is necessary. The result would benefit several fields of inquiry at one and the same time.

As interpreted from the documentary record, history is based less on facts or *events per se*, than on thoughts recorded about them.[2] As such, this form of 'history' is based not upon tangible evidence, but upon statements which have been filtered both through the culture and mind of the recorder and of the historian. This presents a problem when one wishes to create a history of facts or events that were not recorded. In the case of disease history, the original author of documents may not have had the ability nor the knowledge to represent disease accurately with words. Where no documents were created, the historian faces the greatest challenge. Here, the despairing historian tends to turn a blind eye to the topic, assuming it to be outside the domain of history. The disease history of New World aboriginal peoples seems to fall both within and without the domain of history. Where documents exist, even if written by outsiders, historians have analyzed the effects of introduced, infectious epidemic disease. Where the documents were not created, as in the case of pre-Columbian peoples, historians have absented themselves from the on-going research. This, however, is precisely the area where the skills of historians are most needed. As this thesis will demonstrate, there is indeed a role for historians in this discourse, namely in

[2] McKay, "The Coalescence of History and Archaeology" *Historical Archaeology* Vol.10 (1976), p. 93. Also see R.G. Collingwood (1939).

giving cultural meaning to biological data. If ethnological knowledge is a product of what the subject wants to tell, as Michael Bravo has stated persuasively, then the use of archaeological and anthropological data is doubly important in disease history because it has the potential to reveal what is not spoken or recorded.[3] A history may thus be created that is not based solely upon the documentary traces of thoughts but on empirical evidence of disease.

'Disease history' is not the same as medical history. In considering a logical place for a discourse of disease, it appears that while disease certainly appears in historical studies, there is also a need for it to be considered as a subject in and of itself. Mention of disease, of course, has been made in traditional histories. In political and economic texts, it is noted as a disruptive factor and in social histories it appears, more often than not, as an instrument of guilt and oppression. Yet it is sidelined; disease is considered only in reference to what it destroys or disables. No clear discussion has yet been made in Canadian historiography about disease as a persistent biological reality. Truly, a disease is only as important as we think it is, and this importance is generally judged on how it affects the social, cultural, political and economic institutions. Diseases have the power to affect all of these adversely, in addition to disabling individuals and decimating populations. As such, it is a key factor in all areas of history, and deserves therefore to be considered in all fields of historical research. A separate area of study is needed, however, one which examines disease from a biological perspective so that the physical basis may first be understood. Only then can a thorough discourse be offered about the cultural impact of disease. Understanding this biological reality assists the historian both to examine the cultural impacts and to remove the default modes of interpretation that have clouded the issue of disease in history. Heavily reliant upon documentary data, Canadian and Native historiography have been weakened by preconceived ideas about the disease

[3] Michael Bravo, "Ethnological Encounters" in N. Jardine, J.A. Secord and E. Spary (eds.), *Cultures of Natural History* (Cambridge: Cambridge University Press, 1996), p. 351.

history of New World aboriginal peoples. These notions rely heavily on issues of blame and guilt.

Early studies in Canadian history largely ignored the role of aboriginal peoples, and also ignored the dramatic effects of disease upon these peoples. This is a reflection of the racial and cultural prejudices of many early historians who allowed their presentist values to cloud their interpretation of the past. Aboriginal peoples, viewed in many ways as an organic part of the landscape, were not much examined as agents in the formation of Canadian history, nor were the effects of disease upon populations and cultures much noted. As we shall see (in a review of the literature in Chapter Two), disease is only mentioned when it prevented the aboriginal peoples from conducting business with the fur trading companies. In modern Canadian historiography, the default interpretation is that aboriginal peoples were affected only by introduced, infectious epidemic disease. Of the diseases that these historians have studied, smallpox has received the most attention. Discussion is typically made of the effects of smallpox on population size and distribution of aboriginal peoples, often with some analysis of the social and cultural effects of this infectious disease. But no mention is made of endemic or chronic disease and little attempt is made to understand the pre-contact state of health of aboriginal peoples. The predilection towards the study of introduced disease appears to be based on a number of factors. Because of their catastrophic effect on aboriginal societies, these diseases are more likely to appear in the documentary record, a fact that makes them likely candidates for traditional historical study. But there may be another reason that historians have focused their attention on these diseases to the exclusion of indigenous diseases. Introduced epidemic diseases, like the subject of imperialism, have more emotional volatility attached to them.[4] Diseases, seen as an invisible agent of

[4] The term 'introduced disease' is used in this thesis to indicate diseases that were brought to the New World from the Old in the post-contact period. Historians, as we shall see, have often referred to these as 'European diseases', a term which is value-laden and potentially incorrect.

empire and even referred to as "biological imperialism",[5] are lumped together with all things *introduced*, and spoken of with the same language. Edward Said commented that "post-imperialism has permitted mainly a cultural discourse of suspicion on the part of formerly colonized people"[6] and this discourse may well describe much contemporary Canadian and Native historiography.

In the field of Native history, the default interpretation follows that of Canadian history more generally, but it also supports the premise that aboriginal peoples lived in a "pristine, disease-free, pre-Columbian New World."[7] Any diseases suffered by aboriginal peoples are considered to be introduced diseases. These diseases, moreover, are all labeled "European', ignoring those illnesses that originated in Africa and Asia, many of which undoubtedly were carried to the New World during the slave trade and other periods of forced migration or willing immigration. This type of blame in Native history has resulted in what Said describes as "polarization that absolves and forgives ignorance and demagogy more than it enables knowledge."[8] This ignorance relies upon misinterpretation and misunderstandings of the biological characteristics of disease and its process. Bruce Trigger has suggested that the dichotomy between history and anthropology has led to these misunderstandings.[9] The default interpretations present in Canadian and Native historiography have proved this point — the errors and omissions leading to the creation and persistence of the default interpretations exist only because historians have not chosen to seek out the physical evidence that proves otherwise. This is, as mentioned above, a by-product of a preference for documentary data, yet it also appears to be a bias in

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[5] Andrew Nikiforuk, *The Fourth Horseman: a short history of plagues, scourges and emerging viruses* (Toronto: Penguin Books, 1991).
[6] Edward Said, "Discrepant Experiences", in his *Culture and Imperialism* (New York: Random House, 1993), p.194.
[7] Arthur C. Aufderheide, "Summary on Disease before and after Contact", in John W. Verano and Douglas H. Ubelaker (eds.), *Disease and Demography in the Americas* (Washington: Smithsonian Institution Press, 1992), p. 165.
[8] Said, "Discrepant Experiences" in *Culture and Imperialism* (1993), pp. 31-32.
[9] Bruce Trigger, *Natives and Newcomers: Canada's 'Heroic Age' Reconsidered* (Kingston and Montreal: McGill Queens University Press, 1985). See pages 27-28 below.

favour of the discourse of epidemic disease. It is easier to fill pages with dramatic events (and with blame and guilt) than to present an argument about the transmission and effects of disease. History, however, must not be agenda-driven. It must be recognized in our historical narratives that diseases are biological processes that do not choose their victims based on colour or creed. Europeans, for example, can be held no more responsible for transmitting disease than for unwittingly bringing the seeds of the dandelion to the New World.[10] To argue otherwise is to ignore the fact that disease is a natural process, and one that is often beyond the control of its hapless vectors.

To consider disease unnatural is to unwittingly support the ideas of blame and guilt. The root notion is that if a 'natural' state is disrupted, then someone or something 'unnatural' caused it. This is a theme which is found both in Canadian and Native historiography. Europeans, as vectors, are held to be the guilty parties in the spread of disease, and these diseases are believed to have created unnatural physical and social responses among their hapless victims.[11] While the impacts of introduced diseases were indeed profound and the cultural responses to them unprecedented, the biological reality of disease transmission is in no way unnatural. Disease, from the biomedical perspective, is a deviation from clinical norms; it is productive of an organic pathology or abnormality in its host. While it produces an *abnormal* state in the human body, it is by no means an *unnatural* state nor is it an extraordinary statistical event. These are distinctions that have apparently been lost in the field of history. Because it is a biological process,

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[10] Alfred Crosby's discussion of introduced weeds is in many ways a metaphor for the introduction of disease. Both are considered 'pathogens', which spread rapidly and tend to outcompete or kill off indigenous species. Crosby's analysis is free of ideas of blame, as he recognizes the natural tendency for biological entities to spread and multiply. This applies as much to a virus as it does to a plant. See Alfred W. Crosby, "Weeds", in his *Ecological Imperialism: The Biological Expansion of Europe, 900-1900* (Cambridge: Cambridge University Press, 1986) p.149.

[11] See Georges Sioui, *For An Amerindian Autohistory: an essay on the foundations of a social ethic*, foreword by Bruce Trigger (Montreal: McGill – Queen's University Press, 1992) and page 31 below, where Sioui claims that Europeans were living in an unnatural state, and thus brought the 'punishment' of disease upon themselves. This, of course, rejects the idea that disease is a natural process, and also ignores the fact that aboriginal peoples had disease before contact.

disease is a natural and normative part of all lifecycles. Diseases have always been present in aboriginal societies.

If it accepted that disease is natural, then it must be agreed that the 'virgin-soil' characteristics of introduced epidemics were fundamentally natural as well. Whenever and wherever biological boundaries have been crossed, disease has followed. Introduced into a population with no acquired immunity, infectious disease may become a 'virgin-soil' epidemic, characterized by high morbidity and mortality rates. Smallpox is merely one example of the 'virgin-soil' epidemics experienced around the world. This type of event was not restricted to the contact period in the New World. Wherever different populations have interacted across physical or cultural boundaries, the introduction of disease has occurred. This is not an intentional by-product of culture-contact, but neither is it an unnatural one. The same situation occurs amongst plants and animals and it underscores the point that it is a fully natural and statistically - commonplace phenomenon.[12]

To remove the cultural issues of blame and guilt and to understand disease as a natural process, one must first approach the study of this issue biologically. This biological examination can lead the historian to the study of archaeological and physical anthropological data, where physical evidence of disease from past populations may be recovered. Here, the data is both empirical and quantitative, and the historian may use it to support or refute documented ideas about morbidity and mortality amongst aboriginal populations. The literature review in Chapter Two illustrates the omissions common in Canadian and Native historiography, and justifies the argument that we should be prepared to look beyond the documentary record for data. The most important contribution made through the use of physical evidence is the way it assists the historian to destabilize the preconceived ideas about disease commonly found in the historiography. The few historians who have attempted to conduct studies in

[12] See for instance *bovine spongiform encephalitis* (mad cow) disease, or Dutch elm disease.

disease history have pointed to the potential of archaeological and physical anthropological data, but neither they nor their colleagues have made the leap to actually exploiting these sources. Historians have tended to restrict their analysis to the introduced, infectious epidemic disease, with no discussion of chronic disease. Little consideration is given in the current literature to the pre-contact health of aboriginal peoples in the New World. But it makes no sense to try to understand the effects and impact of introduced disease without first having a clear understanding of the prior state of health. Aside from some educated guesses and vague generalizations, historians have not provided solid evidence of disease in pre-Columbian populations. This is not due to a lack of information but rather (on the one hand) to the pervasive belief that this issue lies outside the domain of history and (on the other hand) to a lack of understanding of how physical data may provide insights to this historical problem. As a result, this type of data has been undervalued and under used by historians.

The act of interpreting physical data is the most important role that historians can play in understanding disease in aboriginal populations. As Chapter Three suggests, the interpretive work done by archaeologists and physical anthropologists has not been recognized by historians as appropriate for their work.[13] The physical evidence of disease is often presented as raw data and relegated to the appendices of field reports. It is there for the historian to use and to interpret. Interpretation is the strength of the historian, who derives meaning from words, and who can do so with physical evidence of disease if an appropriate paradigm shift can be made in what is seen as constituting the evidentiary raw resources of the discipline.

[13] This is not to say that interpretation is not a part of archaeology or physical anthropology, only that interpretation is usually restricted to identification of the object or disease. Archaeologists and physical anthropologists have tended to remove themselves from discussion of 'meaning', claiming that cultural and temporal differences between themselves and their objects of study render any meaning they would attempt to give to an object less meaningful. As a result, most field research and published works are limited to the recovery and morphological identification of remains and quantitative analysis and comparison, with less attention paid to giving these remains meaning within a broader context.

Historians of disease must become proficient in the use of physical data. For a historian to analyze disease biologically, he or she must first examine its defining characteristics — whether it is a virus, bacteria, protozoan or parasite, how it is transmitted, how it is expressed in the human body, and other particulars. Usually, a scholar of history has no formal training in the natural sciences beyond an introductory course or two taken to satisfy undergraduate program requirements. Little background in needed, however, if the historian is willing to learn the basics of biology and palaeopathology, and to consult with researchers trained in the field of archaeology, physical anthropology and biomedical studies. One need not be a physician to understand the effects and processes of disease upon the human body — one need only to consult an expert. The advantage for the historian is that professionals in other fields are intrigued by the discussion of disease in past populations, and are usually thrilled to assist the historian to interpret the data to find meaning. Chapter Four gives greater detail on the steps that may be taken by the historian to gain a working understanding of disease and to glean an ability to incorporate physical data in studies of disease history.

If the historian of disease can make this paradigm shift and can use physical data as part of an interdisciplinary study of disease in past populations, not only will the individual work be stronger but the discipline will benefit. The result of an acceptance of alternate data sets would be integrated, holistic studies, based on a wider range of information. The diversity of information thus available could only improve the historian's ability to make meaningful discourse of the presence of disease in past populations, and to explore the physical and cultural impacts of such diseases. This thesis aims to demonstrate how this may be done, and it uses the case of aboriginal disease history as a particular example. A literature review of Canadian and Native history will show how traditional documentary-based studies have not touched upon the topic of the pre-contact state of health of aboriginal peoples, nor adequately addressed the issue of post-contact disease. The omissions found there justify the use of physical data. Chapter Three provides an overview of exemplary works in the fields of archaeology and

physical anthropology and uses the example of human parasitic disease to illustrate how this data may improve our understanding of both pre- and post-contact aboriginal health. The concluding Chapter looks at how historians might incorporate physical data into their own studies of disease history. This thesis is, in many ways, not so much a historical study *per se*, as it is a prescription for how disease history should be treated and how historians, as practitioners, should position themselves to conduct these studies.

Chapter Two
Historiography and Disease History

> *"The dead Red Men were buried by white hands. Amid it all, the trade in furs continued."*[14]

Standard Canadian historical studies have a shortcoming in common, namely a reluctance to record adequately and to interpret the effects of disease on aboriginal peoples throughout time. This is not to say that historians have not attempted this task, but that the topic has not been dealt with thoroughly, and historians have not to this point been concerned with providing a deeper understanding of all aspects of disease in pre and post-contact societies. An examination of the literature reveals that historians, if they have mentioned illness at all, have unnecessarily restricted their analysis to the study of introduced epidemic disease. While these diseases wrought far more drastic and immediate consequences upon aboriginal peoples in the New World, to study them to the exclusion of endemic and indigenous disease makes no sense. How can the effects of introduced disease be placed in their proper contexts without having a full understanding of what was there before? Knowledge of endemic disease is a logical and necessary prerequisite — only then can the effects of introduced epidemics be properly assessed. Without this basic knowledge, Canadian historiography, and more specifically Native historiography, is incomplete and misleading scholarship that gives the impression — and in some cases explicitly asserts — that aboriginal peoples lived in a 'disease-free paradise' prior to contact with Europeans.

This chapter reviews exemplary monographic work in the fields of Canadian, fur trade, and native history. It demonstrates the inadequacy of the treatment given to the topic of aboriginal peoples and disease. This chapter also demonstrates that the field of medical history, in which one might suppose to find a superior

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[14] Arthur Morton, *History of the Canadian West to 1870-71* (Toronto: University of Toronto Press, 1939), p. 332.

analysis of the subject, also falls short of providing a clear overview of the state of health and disease of aboriginal peoples in the pre- and post-contact New World. Following these surveys is a discussion of the historiographical and empirical problems that presently characterize this domain of historical research.

General Studies in Canadian History

The 'old school' texts which appear on nearly every required reading list for the student of Canadian history have much to recommend them, and they rightfully are considered classic studies. For the purposes of this thesis, Arthur Morton's *History of the Canadian West to 1870-71* and *Empire of the St. Lawrence* by Donald Creighton are two texts used as representative of this type of work.[15] Examined through the eyes of a student interested in the experience of disease, however, these studies are riddled with errors and omissions. Further, these works are highly biased towards the type of information that can be retrieved from the documentary record, specifically the written material of the Hudson's Bay Company. This type of source, however, is not the best for uncovering a clear picture of the disease experience of aboriginal peoples, as we shall see. In fact, studies based on documentary data are limited in what they may speak to regarding disease in history. In order to identify what these studies lack and how they may be improved upon, it is important that we understand what they are.

The classics of Canadian historical writing share a common structure — the past is interpreted through political and economic means, and through a narrative structure of progress. In this Whig interpretation of history, all activities and actions in the past are seen as steps in the creation of a greater whole, with its

[15] These works were chosen 'unscientifically' by polling other graduate students who had taken undergraduate level history courses at the University of Alberta. These texts were consistently mentioned as remembered from required or suggested reading lists. Annotated bibliographies, including *ISIS* and Brian Gobbet and Robert Irwin's *Introducing Canada: An Annotated Bibliography of Canadian History in English* (Lanham and London: Scarecrow Press, 1998), were also examined for any works pertaining to Disease history. While there references to medical history, there were no works found that could be classed as Disease historiography.

ultimate realization being the creation of the nation.[16] Thus Alexander Mackenzie's explorations, as interpreted by Morton, take their proper setting in the light of his aims as an exponent of a scheme of continental organization.[17] The author's interpretation is that everything can best be explained as part of an evolution towards the present. In this style of discourse, aboriginal peoples were considered as much an organic part of the landscape as the plants and animals, and they had as little agency as these.

In scope, *History of the Canadian West to 1870-71* is an exhaustive work and it has, at its centre, the role of the fur trade in the creation of the Western region within the nation. Morton considered aboriginal people to be little more than a part of the environment, and they appear in his study to hinder, rather than assist, in the creation of the region and nation. When they are not a part of the background, they are presented as backward, culturally - static peoples, who had a very minor 'walk-on' role in the grand story. The role of aboriginal people in the fur trade was largely ignored in *History of the Canadian West to 1870-71*. Morton either did not seek out documentary data of aboriginal involvement or he chose to ignore it. This would seem the only way to explain the apparent unfamiliarity with the documentary record that lie behind remarks such as this one: "Hence these happy relations between the Cree and Whites which have meant that but little mention is made of these interesting Indians in the pages of those who have written books and journals".[18] Morton clearly was not familiar with the body of primary historical documents in which the roles of the Cree and other aboriginal peoples were recorded.

While omission is one sort of error, Morton's view of disease and aboriginal peoples is another. On the occasions that Morton brings up the issue of disease, he refers exclusively to smallpox, which was an introduced, infectious, disease. It is

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[16] See Herbert Butterfield, *The Whig Interpretation of History* (London: Bell Publishing, 1931).
[17] Morton, *History of the Canadian West to 1870-71* (1939), p. xviii.
[18] *Ibid.*, p. 7.

clear that he lacked a basic understanding of the causes of disease generally and, specifically, the consequences of the introduced infectious diseases for which the New World was 'virgin soil'. In questioning why Europeans did not catch the diseases that killed whole tribes of aboriginal peoples, Morton displays not only an ignorance of disease, but also hints that he may have shared the attitude that many early Eurocanadians had. The view that Indians fell victim to disease because they were physically inferior, and the associated view that their deaths from diseases that left Europeans untouched was a sign of their moral and spiritual inferiority, was commonly held by eighteenth and nineteenth century Eurocanadians and contemporary historians.[19] Morton also makes statements such as: "The infection was brought from the south by the Salteux — who are said to have attacked whites in American territory stricken with it, and to have become victims themselves by wearing their clothes".[20] This may be interpreted as implying that aboriginal peoples deserved the diseases that they acquired. It is ironic that Morton chose to use this bit of information, as it contradicts his notion that only aboriginal peoples fell victim to smallpox and other introduced diseases. Remarks like these demonstrate that Morton did not understand the etiology of disease, nor was he interested in exploring the role that aboriginal people played in Canadian history, nor was he sympathetic to the aboriginal experience of disease.

Donald Creighton's *Empire of the St. Lawrence* is in the same vein as Morton's work. In the preface he states that the book (originally titled "*The Commercial Empire of the St. Lawrence*") "is a study in commerce and politics".[21] His book is structured as a nation-state building story, emphasizing the political and economic themes and episodes that characterize the early classic texts in Canadian

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[19] That aboriginal populations around the world were "thinned" lent credence to the view that God was clearing the way through pagan lands for Christian settlement, another belief popular with both settlers and early writers. See Sheldon Watt, *Epidemics and History: Disease, Power and Imperialism* (1997).

[20] Morton, *History of the Canadian West to 1870-71*, p. 329.

[21] Donald Creighton, *Empire of the St. Lawrence* (Toronto: Macmillan Company of Canada, 1956), p. i.

historiography. The St. Lawrence River, as a symbol of the various structures and infrastructures of the fledgling country, is seen by Creighton as the basis of a "transcontinental, east-west system, both commercial and political in character".[22] Within this system, aboriginal people, according to Creighton, played but a minor role. Called the "troublesome poor relations of the Canadian state" [23] or "primitive hunting races"[24], aboriginal peoples are noted only in reference to European or Eurocanadian activities, particularly when they hindered trade or 'massacred' whites. He did give credit to the aboriginal people, who, through

> the cunning adjustments of their heritage, and something of their proud passionate independence, helped, in their turn, to create that curious western world of half-tones, that blent society where Europe and America met and mingled.[25]

Creighton, in this ancestor to Richard White's "Middle Ground" hypothesis (discussed below) makes no discussion of disease, introduced or otherwise. This seems odd, as surely it was a factor for or against the ambitions, programmes and struggles which had their central inspiration in the St. Lawrence river.[26] This is typical of this early texts in Canadian history: it covers the political and economic aspects of the past, but as Gitlin has noted of this style of historical narrative, "It makes a damn good story, but it's not the whole story".[27]

Fur Trade Studies

In the early works of fur trade scholarship, aboriginal peoples, as in the more general studies noted above, were very much backgrounded in the great epic as part of the scenery or as colourful, but static, cultural groups. As an object of historical enquiry, the fur trade was defined within political and economic parameters, and as an institution it was viewed by historians as providing the base for the modern Canadian nation. These texts, like the preceding two, relied

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[22] Creighton, *Empire of the St. Lawrence* (1956), p. iii.
[23] *Ibid.*, p. 32.
[24] *Ibid.*, p. 16.
[25] *Ibid.*, p. 16.
[26] *Ibid.*, p. i.

heavily on the written record to the exclusion of other sources. Aboriginal peoples were again given little agency. It is not unexpected, then, that there is very little in-depth analysis of disease in early fur trade monographs. Generally, one only finds mention of illnesses among the Native peoples when disease prevented them from carrying out hunting or trade, or when the epidemic reached such proportion as to be considered remarkable. The first two texts mentioned below, by Harold Innis and E.E. Rich, may be considered with Morton and Creighton's works as standards of Canadian history. All four share the same preoccupation with the economic and political aspects of history and betray a similar lack of regard for the aboriginal experience and for the effects of disease in the fur trade. A third monograph, by Arthur J. Ray, represents a change in the scope and methodology of fur trade studies. Here, the role and experience of aboriginal peoples is more thoroughly examined.

Harold Innis' *The Fur Trade in Canada* is subtitled *An Introduction to Canadian Economic History*. The title sums up the approach taken by pioneering studies in fur trade history — the fur trade was defined as an economic institution and as the basic infrastructure upon which modern Canada rested. Innis believed that understanding the fur trade was a basic requirement for understanding Canadian history as a whole. It was his sense, then, that history has at its centre politics and economics. His text is the definitive political and economic history from the formative years of fur trade studies, and it was one of the founding works of the "Laurentian School", which hypothesized that a combination of geographic and economic determinism played a major role in shaping the history of the nation.

The Fur Trade in Canada exhaustively details nearly all aspects of the economic trade — from north to south, east to west, from the frontier period through the industrial revolution and into the twentieth century. Still, it misses a substantial

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[27] Jay Gitlin, "On the Boundaries of Empire", in William Cronon *et al* (eds.), *Under An Open Sky: Rethinking America's Western Past* (New York: W.W. Norton, 1992), p. 80.

amount of information: there is no discussion of the role of aboriginal peoples. Bruce Trigger remarked:

> Harold Innis has been described as placing Indian culture at the centre of the fur trade.... He clearly appreciated the important role that Indians had played in this trade. Yet he paid little attention to the Indian end of it. He ignored cultural differences and social organization as factors shaping the role played by native groups.[28]

In fact, he plays little attention to aboriginal peoples at all. In considering disease and its effects on aboriginal peoples, Innis refers only to smallpox and its spread between tribes. He makes no attempt to discuss the consequences of this introduced infectious disease, beyond saying that it was a disruption to the infrastructure of the trade. No mention is made of any other disease, whether introduced or endemic to aboriginal peoples before contact. This is another pattern which persists in later fur trade studies — smallpox is the only disease that consistently gets attention from historians, as if its drastic consequences and highly infectious nature have made it more fit for study. To be fair, it is likely that this disease receives more attention in the historical literature exactly because it received more notice in the documentary record. Historians, trained to privilege this type of source, then overlooked other relevant data. In any case, smallpox has remained until very recently the one disease that has received substantial attention by historians.

E.E. Rich's 1967 text *The Fur Trade and the Northwest to 1857* follows many of the patterns set by Innis. In Rich's work, aboriginal peoples are relegated to a chapter entitled "The Northwest: The Geographical background", and are considered to be as much a part of the terrain as the plants and rocks. When discussed further, the aboriginal peoples have been given no agency, and remain in this text only as economic variables, sidelined by contrast with the actions of Eurocanadians. Consider the index in Rich's book, where one finds that references to "*Indians*" are specifically: "*British policy towards*", "*trading habits*"

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[28] Trigger, *Natives and Newcomers* (1985), p. 38.

and "*missions to*". Again, this is not the kind of study in which one can expect a clear picture of the effects and issues of disease amongst aboriginal peoples. Like Innis, Rich refers only to smallpox, and only when it is seen to disrupt trade. In fact, his brief section on this illness is almost a repeat of page 329 of Morton's book, but without the implications that aboriginal peoples deserved the illness they were transmitted.

In *The Fur Trade and the Northwest to 1857*, Rich lets the reader know that, in his view written history is a product of the documents available to the historian.[29] This is a clear indication that Rich, like other contemporary historians, did not attempt to utilize any interdisciplinary methods or sources of data. This is one of the true weaknesses of the older works – the inability to look beyond the documentary record. It is for this reason, ignoring the archaeological and ethnographic evidence that was surely available in the mid-1960s, that Rich was able to write of the "advance of human settlement into the empty spaces of the North American continent".[30] An historian utilizing all available resources to examine the past would not have been able to make a statement that blatantly ignored the aboriginal peoples who lived on the land. The fact that historians have been so reluctant to look beyond the documentary record means that works based solely on the written record do not provide a satisfactory discourse of disease. Without the use of non-documentary resources, there is little data available with which to make a conclusive argument – or any argument at all.

Arthur J. Ray's *Indians in the Fur Trade: their role as trappers, hunters, and middlemen in the lands southwest of Hudson Bay, 1660-1870*[31] represents a dramatic shift in perspective from the works reviewed above. Rather than briefly

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[29] E.E. Rich, *The Fur Trade and the Northwest to 1857* (Toronto: McClelland and Stewart Limited, 1967), p. xi.

[30] Rich, *The Fur Trade and the Northwest to 1857* (1967), p. ii. This statement could also be seen as referring to the depopulation of the continent through introduced infectious disease, a fact which would have by no means left Canada "empty", but more sparsely populated than in pre-contact times. This is not an avenue Rich explores.

mentioning aboriginal people in reference to Eurocanadian activities, Ray took a bold step and analyzed the responses of aboriginal peoples and their roles in the trade. As a historical geographer, he has much to say about the demographic changes of aboriginal peoples, and he notes the role of disease in these changes. Chapter Five of *Indians in the Fur Trade*, entitled "*Migrations, Epidemics and Population Change*", referred to the impact of introduced infectious disease. He thoroughly examined the demographic changes wrought by three successive smallpox epidemics[32] on the plains, and he included statistical evidence through the use of death tolls. Ray also provided one example of an aboriginal response to smallpox, which attempted treatment by jumping into cold water, a therapy said to have disastrous consequences.[33] This statement is intriguing for it suggests that some data on the aboriginal view of disease and of healing exists in the documentary record, if historians choose to look. Another strength of Ray's study is that he moved beyond the typical discussion of smallpox to note the devastating effects of two other introduced infectious diseases, measles and whooping cough. However, Ray provided no information on the base level of disease and illness within aboriginal societies before contact. Relying as he has on documentary data, it is unlikely that he could have provided this information without an interdisciplinary examination of the problem.

Fur Trade Social History

If political and economic histories lack an adequate discussion of disease, it might be presumed that the paradigms of social history would allow for a better analysis of the cause and effect of illness. Since social historians focus on the social and cultural conditions of past peoples, and how these relate to the political and economic institutions, there is a greater potential for the recovery and

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[31] Arthur J. Ray, *Indians in the Fur Trade: their role as trappers, hunters, and middlemen in the lands southwest of Hudson Bay, 1660-1870* (Toronto: University of Toronto Press, 1974).

[32] Ray, *Indians in the Fur Trade* (1974), pp. 94-116. Ray explores the smallpox epidemics of 1780-81, 1838 and 1869 among the Assinibione. See also Arthur J. Ray, "Diffusion of Diseases in the Western Interior of Canada, 1930-1850", *Geographical Review* 66, no.2 (April 1976), pp. 139-57. In addition to smallpox, Ray also considers the effects of influenza, scarlet fever, measles, and how trade networks assisted in the diffusion of these infectious epidemic diseases.

interpretation of disease data from the documentary record, if such data exists. Disease impacted the political and economic infrastructure, social structure and the cultures of groups, thus making it an ideal candidate for study by social historians. Two of the leading texts in the field of fur trade social history, which detail the roles of both women and aboriginal peoples within the trade, were examined too see how disease is treated in this form of historical enquiry. Jennifer Brown's *Strangers in Blood: Fur Trade Company Families in Indian Country* and *Many Tender Ties: Women in Fur Trade Society, 1670-1870* by Sylvia Van Kirk were examined for this purpose. It was hoped that the social historians of women and aboriginal peoples would have much to say on the topic of disease, specifically about the role women played in treating illness and the effect disease had across the cultural boundaries. Unfortunately, these texts did not take the study of disease further than the traditional histories as noted above, suggesting that social historians have been as unlikely to make meaningful discussion of disease in past peoples as are political or economic historians.

Jennifer Brown's *Strangers In Blood* detailed the role of women in trade, politics and exploration, and provided a good examination of the social and 'cultural' differences between the Hudson's Bay and North West Companies. She was aware of the shortcomings of the historical record, and she noted the limitations of fur trade records. Illness and disease are minimized in this study due probably to this restricted source of data. In one of her very few references to disease, Brown noted that " the adjustment and health problems of Indians taken to Europe were generally considerable", without stating what those health problems were. [34] While aboriginal peoples taken to Europe experienced health problems, the much larger issue is the health problems of aboriginal peoples who lived and stayed in the New World. It is puzzling why Brown chose to remark on the exceptional cases and why she ignored the plight of the majority who remained in "Indian

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[33] Ray, *Indians in the Fur Trade*, p. 106.
[34] Jennifer Brown, *Strangers in Blood: Fur Trade Company Families in Indian Country* (Vancouver: UBC Press, 1980), p. 67.

Country". On this topic, her work is virtually silent. Brown speaks of many of the factors which played a role in the transmission of disease, such as housing, food and human relations, but she does not mention illness as being a result of (or a problem compounded by) these variables. In this way, the biological reality of disease is ignored.

Brown's study also chose not to explore the roles women typically have played as administrators of health care and medical treatment. Native or mixed-blood wives to traders presumably brought with them indigenous healing techniques, practices that would have crossed cultural boundaries. These forms of traditional healing would have been passed along to the Eurocanadian men of the fur-trading companies, and down through their descendants. The treatment of disease, especially those diseases which Eurocanadian peoples were not familiar with or were unable to treat themselves, would have made the traditional health care practices of the women of the fur trade invaluable. Brown, through her use of documentary data, is unable to shed light on this role, and in fact is unable to provide much in the way of disease data. Thus, the role of women as health care providers, as well as the larger issues of disease, remained untouched in this study.

Sylvia Van Kirk does make mention of disease in *Many Tender Ties*, although in a very limited sense. In many ways, her work raises more questions about disease transmission and healing practices than it answers. Discussion of disease in her study involves women, both in the roles of vector and victim, and in the role of preventative medicine, a fact that is not surprising given the nature of her topic. In one of the few references to endemic illness in the historiography, Van Kirk notes that women played an important role in gathering the fresh country foods in order to ward off scurvy. One can imply from this statement that aboriginal peoples had experience with this condition, as they were knowledgeable about the treatment for it. She offered, however, no further discussion of the aboriginal experience and understanding of disease in general nor of endemic disease in particular.

In *Many Tender Ties*, Van Kirk referred to fur trade posts as "welfare stations" which provided aid to the starving and *sick*. [35] Without explicitly stating so, Van Kirk referred to a physical crossroad, a place where cross-cultural and biological contacts were the norm. It was in such places that infectious disease found purchase. This concept, however, is not fully investigated in this work. Furthermore, Van Kirk, like Brown, neglected the important social role that women played as ministers of care and she does not countenance the traditional healing knowledge brought to the fur trade by aboriginal and mixed-blood women.

Neither of these texts are particularly convincing on the history of disease, on cross-cultural contacts or on the social factors involved in disease transmission and prevention. Reviews of both Brown's and Van Kirk's work suggest that their interpretations of the social history of the fur trade, of aboriginal peoples, and of women in particular, are vulnerable in many ways. Both authors have been "captive of her sources", in that both relied heavily on the documentary record of the Hudson's Bay Company to the near exclusion of other sources.[36] As these documents were produced by Eurocanadian males, it is difficult at times to make a case that the authors of such documents saw, or fully understood, the roles of aboriginal women. For understanding a woman's role in traditional healing and medical administration, and for understanding aboriginal concepts of illness, documentary records are not the ideal source of data. Oral and physical data are better suited to answering these questions.

Native History

If the classic texts of Canadian history ignore aboriginal peoples, fur trade studies only touch upon their lives, and social history provides an unsatisfying picture of the state of health of the people, how then does Native history fare? One would

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[35] Sylvia Van Kirk, *Many Tender Ties: Women in Fur Trade Society, 1670-1870* (Toronto: Watson and Dwyer Printing, 1980), p. 26 [emphasis mine].

hope that the health of aboriginal peoples, both pre- and post-contact, would be foregrounded in this type of narrative. To investigate this point, five texts have been selected as representative of the field of Native history. Two of the works considered here are basic introductory texts to the field of Native history: Olive Dickason's *Canada's First Nations* and Arthur Ray's *I Have Lived Here Since the World Began.*[37] *The Middle Ground* by Richard White and *Natives and Newcomers: Canada's 'Heroic Age' Reconsidered* by Bruce Trigger are exemplary studies in Native history written by academics.[38] The fifth text, by Georges Sioui, entitled *For An Amerindian Autohistory* represents the type of work that is currently being created as a reaction to traditional scholarly works.[39]

Native history, using the methods of traditional historical enquiry, is closely tied to the discipline of anthropology, which was created in the nineteenth century and charged with studying people *who lacked their own history.*[40] While this assumption is now recognized as incorrect, since aboriginal peoples do in fact possess histories, the field of Native history still borrows freely of anthropological, ethnological and oral historical methods and data. As a result, Native history may be considered more interdisciplinary than other fields of history. This should be a benefit when considering the problems of disease in the past, but does a review of the literature prove this to be so?

The introductory texts to the field of Native history are of great interest, for they are the types of studies that provide information to both historians and the general public. Dickason's and Ray's works are sold by mass retailers, and thus are

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[36] *Canadian Historical Review* (1983), p. 237. While this quote refers in particular to Van Kirk's work, similar criticism was made of Brown's *Strangers in Blood* in the CHR (1980) p. 342-343.
[37] Olive Dickason, *Canada's First Nations* (Toronto: McClelland and Stewart, 1992), and Arthur J. Ray, *I Have Lived Here Since the World Began* (Toronto: Lester Publishing, 1996).
[38] Richard White, *The Middle Ground: Indians, empires and republics in the Great Lakes region, 1650-1815* (Cambridge: Cambridge University Press, 1991) and Bruce Trigger, *Natives and Newcomers* (1985).
[39] Georges Sioui, *For An Amerindian Autohistory: an essay on the foundations of a social ethic*, foreword by Bruce Trigger (Montreal: McGill – Queen's University Press, 1992).
[40] Trigger *Natives and Newcomers*, p. 5 [emphasis mine].

potentially available to all segments of society, including those people for whom it could be their first or only insight into this topic. The works by White, Trigger and Sioui, on the other hand, are generally only read by individuals who already have an awareness of the discipline. Regardless of the background or aims of the readers, what information of aboriginal health are they receiving from these studies?

Canada's First Nations and *I Have Lived Here Since the World Began* both provide a general historical overview of aboriginal peoples in Canada, and they both place social and cultural information within a larger political and economic context. The studies by Dickason and Ray deal with nearly all the cultural groups in Canada: where specific tribal groups are not mentioned, each author attempts, at the least, to treat the history of their larger cultural area. The only difference in this respect is that Ray tends to have more detail and accuracy regarding West Coast peoples. For example, Dickason stated that West Coast peoples were less affected by introduced disease than were eastern or plains peoples,[41] an assertion Ray refuted with estimates of the smallpox epidemic of 1862 killing as many as 20,000 West Coast aboriginal peoples.[42] Both authors noted the catastrophic effects of smallpox upon aboriginal groups, and Dickason built upon the inventory of introduced infectious diseases by making note of influenza and tuberculosis.[43] Here again, we see a tendency to note only incidences of disease introduced from the Old World, while overlooking endemic, indigenous diseases.

What of endemic disease and what of disease that was present in the New World prior to contact with Europeans? On this subject, very little is said in either text. Dickason, like Van Kirk, mentioned aboriginal cures for scurvy, again indicating that aboriginal peoples possessed both knowledge and prior experience with this

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[41] Dickason, *Canada's First Nations* (1992), p. 211.
[42] Ray, *I Have Lived Here Since the World Began* (1996), p. 191.
[43] Dickason, *Canada's First Nations*, p. 567.

illness.[44] An intriguing piece of information in Dickason's text gives an insight into pre-contact ideas about disease causality and therapy. She stated that the Cherokee believed that disease was brought by animals and cured by plants.[45] While Dickason neglected to say when this belief was held, the Cherokee were not likely to be referring to the infectious diseases introduced through contact with Europeans. Hence, this may be an indication of a pre-contact belief towards disease transmission and cure. However, there is little else in Dickason's study or in Ray's text to give the reader a better idea of the perceptions of aboriginal peoples towards disease, especially endemic and indigenous diseases. Considering the importance of healers in aboriginal societies, it is odd that no further consideration is given to disease and healing in these texts. This is a topic that historians have been remiss in considering – more information is needed on the aboriginal understanding and experience of disease from the people who suffered them. Historians might better investigate this topic through exploiting ethnographic and oral historical data.

Richard White's *The Middle Ground: Indians, empires and republics in the Great Lakes region, 1650-1815* moves away from imperialist ideas of conquest and assimilation and looks for a metaphorical 'middle ground' which White finds physically as a world made of fragments that relied on disease, war and famine for its genesis,[46] a point that we shall return to. As we have seen already, the historians' discourse of fur trade era relationships between aboriginal peoples and Europeans and Eurocanadians is generally described with the language of imperialism. White, however, found this relationship to be

> an imperialism that weakens at the periphery. At the center are hands on the levers of power, but the cables have, in a sense, been badly frayed or even cut. It is a world system in which the minor agents, allies, and even subjects at the periphery often guide the

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[44] *Ibid.*, p. 168.
[45] *Ibid.*, p. 43. This does not support Calvin Martin's *Keepers of the Game* hypothesis, in which Martin states that aboriginal peoples, believing that animals were responsible for epidemic disease, embarked on a "war of extinction" against them. Bruce Trigger, in *Native and Newcomers* does not believe there is enough evidence to support this hypothesis.
[46] White, *The Middle Ground* (1991), p. 1.

> course of empires. This is an odd imperialism and a complicated world system.[47]

What White has described is, in reality, how European imperialism had always worked.[48] When White describes "an odd imperialism where mediation succeeded and force failed, where colonizers gave gifts to the colonized and patriarchal metaphors were the heart of politics"[49], he is not describing an "odd" imperialism, but the way in which the political theory has played its self out around the world. Imperialism may be at its most dynamic and active at the periphery, in this case the physical and theoretical meeting ground between aboriginal and European cultures, rather than at the imperial metropole. This discussion of imperialism leads to the focus of White's text, namely the relationships developed in culture-contact zones and their consequences. It should not be a surprise to White that aboriginal peoples should have adapted so well to a 'middle ground'. Aboriginal peoples, through tribal affiliations and intercultural contact, have lived and dealt with culture-contact zones for millennia, and they have understood the potential for conflict that goes along with them.

White's previous point, that the 'middle ground' was peopled with the refugees of disease, war and famine, underscores the integral role of disease in this history. In fact, it is of paramount importance, surpassing the other three in its destruction, for, "smallpox wielded a hatchet far more bloody than any the combatants possessed."[50] Yet, for such an important factor, not enough attention is given to it and no mention is made of the state of health of peoples before contact. In this study, like so many others, the author has limited his analysis to the effects of introduced epidemic disease. White consciously avoids the ethnohistorical technique of 'up-streaming', or using ethnologies of present-day or of nineteenth-century peoples to interpret aboriginal societies of the past. While use of this

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[47] *Ibid.*, p. xi.
[48] Julian Martin, personal communication, July 28, 2000. Also see Edward Said "Discrepant Experiences", pp. 31-43 and 191-209.
[49] White, *The Middle Ground*, p. 145.
[50] *Ibid.*, p. 229.

technique for cultural information may imply that aboriginal peoples were culturally static, this technique may not be flawed when examining biological variables such as disease. While many diseases do mutate and evolve, others, such as parasitic infections, appear to remain unchanged through time, and human responses to certain parasitic diseases may be unchanging as well.[51] One may draw valid conclusions from this form of physical data and not be accused of 'up-streaming'. Hence, White is able to refer to documents that speak of 'virgin-soil' epidemics, where a new bacteria or virus was introduced to a population that had no immunity. This was a hopeful sign that historians were beginning to consider the biology of disease, a step that could lead to an improved understanding of health issues in aboriginal societies. However, this progression did not go far enough. The fact that the index to White's text states "*Disease: see Epidemics*" sums it up: even when historians recognize the enormous impact of disease on a culture, they look no further than the introduced infectious epidemic diseases.

Bruce Trigger, while not an historian, limits his study of disease and aboriginal peoples in much the same way as the historians discussed above, demonstrating that historians are not the only scholars to be remiss in noting base levels of illness in their discussions of post-contact introduced disease. In *Natives and Newcomers: Canada's Heroic Age Reconsidered*, Trigger, an archaeologist, uses interdisciplinary methods to examine the demographic collapse of aboriginal peoples. There is, Trigger believes

> no problem more important for understanding the history and social organization of native American people than determining the magnitude of the demographic collapse following European rediscovery of the New World in the fifteenth century.[52]

In conducting this examination, Trigger worked with the data and methods of both anthropology and history, and he noted the pedagogical differences between the two disciplines, and a dichotomy between them, the persistence of which

[51] See Chapter Three below for further discussion of this point.

"reflects the chronic failure of most Canadians to accept native peoples as being Canadian".[53] This dichotomy is a very serious issue. The dichotomy, I argue in this essay, is a major reason that the problems of disease and aboriginal peoples are not fully understood. With little communication between history, anthropology and archaeology, it has never been made clear which discipline is 'responsible' for this type of analysis. Even worse, the three disciplines do not share the information that they have acquired, making a holistic understanding of aboriginal disease difficult, if not impossible, to gauge.

Trigger takes the first steps towards an interdisciplinary analysis of this problem. Using archaeological and anthropological data in his historical analysis, he is able to make strong statements about the effects of disease on aboriginal peoples. He discusses the physical effects on individuals as well as the social and psychological impacts on communities. One of his most thought-provoking statements is, "the evident antiquity of these practices makes it clear that scholars should not succumb to the temptation of believing in prehistoric times illness had not been prevalent or of concern to native peoples."[54] That is, Trigger notes that many of the native beliefs and practices relating to disease undoubtedly existed prior to 1492, indicating that aboriginal peoples had experience with disease in the time before contact with Europeans. However, he gives no examples of data referring to pre-Columbian disease, but speaks only of the views held regarding introduced epidemic disease. His case study is the cultural ideas the Huron had towards disease, and how they responded to the epidemics introduced in the post-contact period. Epidemics, killing children and elders, broke the moral rules of Huron society, so it was obvious that they would be considered caused by an immoral source, such as witchcraft. Suspected witches were killed, and shamanistic curing societies formed to combat the otherworldly plague.[55] It is interesting to note here that Trigger begins his analysis referring to 'introduced

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[52] Trigger, *Natives and Newcomers*, p..354.
[53] *Ibid.*, p. 5.
[54] *Ibid.*, p. 244.

disease' a term that implies no culpability, but soon reverts to the value-laden 'European disease' used by other historians. A disease, as a biological entity, has no nationality. In fact, many diseases historians have called 'European' originated rather in Africa or Asia.[56] To name them 'European' is to assign blame according to a preconceived agenda, not simply to describe the origin of a biological agent.

The responses to these biological agents may indicate that virulent epidemics such as smallpox were rare. Disease patterns to which aboriginal peoples were accustomed to would not result in the Huron killing members of their own tribe or the creations of curing societies. These were the responses of a people whose population was being decimated, whose collective wisdom was being taken with the death of elders, and whose normative means of dealing with disease did not work. The aboriginal view of disease is supported by the words of Peigan chief Saukamappee, who stated that

> this dreadful disease broke out in our camp and spread from tent to tent as if the Bad Spirit carried it. We had no belief that one Man could give it to another, any more than a wounded man could give his wound to another.[57]

From these two examples, it would seem that aboriginal peoples had no familiarity with the type of infectious epidemic diseases that spread through their communities after European-contact. If this is the case, what kind of diseases did pre-Columbian aboriginal peoples have? Trigger notes the problems with documentary sources, even when disease is mentioned in the post-contact period, where "the lack of sufficiently detailed descriptions of these diseases make the precise identification of most of them impossible."[58] If this is a problem for the post-contact period, it must be expected that knowledge for the pre-contact period is even more difficult to obtain. While Trigger mentions the use of archaeological

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[55] *Ibid.*, p. 245.
[56] Smallpox has been described as originating in China, while malaria, another introduced infectious disease, is of African origin.
[57] Morton, *History of the Canadian West to 1870-71*, p. 18.
[58] Trigger, *Natives and Newcomers*, p. 229.

data, he uses it only for examining the effect of introduced disease — no mention is made of endemic or indigenous disease and no data are used to show actual evidence of disease. Thus, this work represents only the first step towards interdisciplinary studies of aboriginal disease, as it does not take the use of physical, biological data far enough in Trigger's quest for answers.

After Trigger's book, written in 1985, it would be expected that other scholars in the field of Native history would have picked up where he left off. This did not happen. In fact, in many cases, the analysis of aboriginal disease in history seemed to revert to a new low. Georges Sioui's *For An Amerindian Autohistory* is an agenda-driven study in which the world of aboriginal peoples is seen as pre-contact utopia and a post-contact purgatory. Its technical purpose is to act as a call for aboriginal people to become active in the creation of their own history. In spite of its good intention, the text itself fails to strengthen Native history, but weakens it instead with faulty interpretations and 'garden-of-Eden' stereotypes. According to Sioui, aboriginal peoples suffered no disease, warfare nor slavery. In fact, he claims that aboriginal peoples never even enslaved animals, a statement which ignores the use of dogs and llamas, creatures who were unlikely to have worked of their own free will. This book would have the reader believe that the only illnesses suffered by aboriginal peoples were *introduced* disease, and that these diseases were a reflection of the 'unnatural' characteristics of Europeans.

> such an hypothesis questions the very motive for the arrival of Europeans in the New World; for, if Europeans had not for a very long time been largely isolated from the living forces of nature, they perhaps would not have been afflicted with the bacteria that eventually made them leave their own world.[59]

There are a number of blatant errors in this statement. First, Europeans were not 'forced' by bacteria to leave the Old World nor were they "isolated" from the forces of nature any more than were the Aztec inhabitants of Tenochitlan(now Mexico City), a city far larger than any European centres of the time. In fact,

contact with the "living forces of nature" was what brought Old World peoples into contact with disease in the first place — for instance the clearing of land near swamps led to malaria, and interaction with animals lead to internal parasitic, viral and bacterial disease. From a biological standpoint, Sioui does not realise that viruses, not bacteria, were the cause of the most deadly introduced illnesses. However, a most prolific and infectious disease *was* introduced to the Old World from the New and was indeed a bacterial disease — namely syphilis.[60] That New World aboriginal peoples had such a disease does not appear to Sioui as an indication of spiritual or cultural imbalance, nor that aboriginal peoples were living 'isolated from the forces of nature' – in fact, he fails to mention this disease at all. Sioui has no solid understanding of disease history, and uses scant bits and pieces of data not to improve the understanding of aboriginal health, but only to place blame.

While Sioui says that it should be the 'bacteria' that is tried and found guilty, not the victim or the 'oppressor', he tries and convicts the Europeans anyway.[61] Sioui ignores the fact that the probable vectors of diseases such as malaria and yellow fever were African, rather than European.[62] Biological organisms, such as disease, are used in his study to assign blame according to the author's agenda. Historians are supposed to make a concerted effort to avoid allowing personal bias and agenda to colour their perceptions or guide their work. Sioui clearly does not follow this basic principle of historical enquiry. His work is a political statement filled with errors and blatant misrepresentations designed to promote his Utopian Pan-Indian view of aboriginal history. This does the aboriginal community no justice, for all it succeeds in doing is playing into stereotypes that serve history no

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[59] Sioui, *For An Amerindian Autohistory* (1992), p. 3n.
[60] Brenda J. Baker and George J. Armelagos, "The Origin and Antiquity of Syphilis" in Kiple and Beck (eds.) *Biological Consequences of the European Expansion* (1997).
[61] Microbes have "... turned the inhabitants of the Old World into guilty parties and of the New World into victims." *Ibid.*, pp. 4-5.
[62] See Sheldon Watt, *Epidemics and History: Disease, Power and Imperialism* (New Haven and London: Yale University Press, 1997), pp. 110-111, and Nikiforuk, *The Fourth Horseman* (1991).

better than the racism and exclusion of earlier studies – it is merely the other end of the same, dreary spectrum.

Disease Historiography

Medical history is not the same as disease history. The term 'medical history' implies a study of the intellectual content of medical inquiries and of the medical establishment, and an examination of the social and cultural institutions of health care. 'Disease history' requires a different point of view where the historian must first examine and understand the biological factors before determining how the biological has affected the social and cultural features of a society. For the purposes of this study, the term disease history will be used to describe this field of work.

Historians, unused to dealing with biological data, are still coming to terms with the paradigm shift needed to work in this field of study. Disease has been recognized as an important factor in history, but more work has been done on its cultural aftermath than on understanding the biological basis of transmission and infection. As we have seen, historians have tended to restrict their studies to analysis of infectious epidemic disease. In the case of aboriginal history, this has been even more limited to the study of *introduced* infectious disease. These two points will be illustrated below, where a selection of texts shows a strong predisposition towards the study of infectious, epidemic disease. From world history to Native history, the study of epidemic disease is a common theme. Also common are the lack of data on endemic disease and the heavy reliance on documentary data. To demonstrate these points, texts by Zinsser, McNeill, and Watt are used as representative of world - wide historical overviews of disease. Studies by Boyd, Kiple and Beck, and Verano and Ubelaker show the way in which scholars have treated the disease history of aboriginal peoples.

A classic text of medical and disease history is Hans Zinsser's *Rats, Lice and History*. Written near the end of his career, Zinsser's text is a rambling, often

disjointed, examination of the biological factors contributing to the transmission of cholera, an infectious epidemic disease. It contains a few points on the nature of infectious and parasitic disease and a discussion of the social impact of epidemic disease. The importance of disease is emphasized with the clumsy, perhaps bizarre observation that, "if it were not for the fact that so many totally uninteresting people die of disease ... war would not be taken so seriously."[63]

From Zinsser's study until William McNeill's 1976 *Plagues and Peoples*, little was done to study the biological entities of disease in history. More work appears to have been done on the 'great men' and institutions of medicine, while disease history remained underdeveloped. McNeill did a fine job of moving the biology of disease to the foreground while examining the effect of disease on society and culture through time. The point of his study was to record

> the history of humanity's encounters with infectious diseases, and the far-reaching consequences that ensued whenever contacts across disease boundaries allowed a new infection to invade a population that lacked any acquired immunity to its ravages.[64]

McNeill emphasized disease as a natural biological process and removed social ideas of blame, and introduced the valuable concept of disease boundaries.[65] While McNeill relied mainly on documentary sources, he did use some physical data. However, much of this data was from contemporary studies of health and disease, making direct comparisons to the past problematic; it may also be seen as 'up-streaming'. He acknowledged, however, that many of the assertions and suggestions in his text would remain simply that, until more epidemiological studies were completed. To this, I would add that more interdisciplinary studies of disease must be carried out.

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[63] Hans Zinsser, *Rats, Lice and History* (Boston: Little, Brown and Company, 1945), p.51.
[64] William McNeill, *Plagues and Peoples* (Garden City, New York: Anchor Press, 1976), p. 3.
[65] This point, which unfortunately did not seem to be built upon by later historians, is proposed as a topic requiring further study — see Chapter Four below.

A proponent of interdisciplinary work, McNeill recognized the problems associated with the documentation of disease, specifically in the 'far past' where "written records were so imperfect that the scale and significance of what happened were easy to overlook."[66] He does not discuss the problems involved where no documents exist, such as in the case of the pre-contact New World, or in circumstances where no records were created by the subject of study, as with the early post-contact aboriginal peoples. It is for this reason that McNeill feels the use of alternate forms of data is both justified and called for, as he believed most historians to be jaded and too far removed from the threat of disease to truly appreciate its consequences.[67] His message to historians is simple, that "humanity's ever-changing place in the balance of nature ought to be part of our understanding of history, and no one can doubt that the role of infectious diseases in that natural balance has been and remains of key importance."[68] This is as much a reference to modern diseases such as AIDS, as it to past diseases, showing the continuing struggle of humans against microbes, and making disease history a particularly relevant field of study.[69]

Within *Plagues and Peoples* is a discussion of disease introduced to aboriginal peoples after contact. Moving beyond a discussion of "European diseases", McNeill made no attempt to use a biological organism to ascribe blame, but he noted the many places where epidemic disease originated, including Asia and Africa. As a historian, he was able to take data from the documentary record and give it meaning — a case in point being the psychological impact of 'virgin-soil' epidemics, where aboriginal peoples would have been socially and cultural devastated, as well as having their population decimated, while the Spaniards remained unaffected. His arguments would have been stronger if he had used physical data, yet McNeill demonstrated the ability of historians to give meaning

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[66] McNeill, *Plagues and Peoples* (1976), p. 3.
[67] McNeill, *Plagues and Peoples*, p. 4.
[68] *Ibid.*, p. 5.
[69] For further discussion of this point see Nikiforuk, *The Fourth Horseman* (1991).

to a biological process and proved that a valid discourse can take place: one in which blame is not the issue.

On the other end of the 'blame spectrum' is Sheldon Watt's *Epidemics and History: Disease, Power and Imperialism.*[70] This is a discussion of 'biological imperialism' and of how he believed disease acted as an agent of empire in the early contacts period around the world. This is fine blend of politics and biology, containing excellent discussion of the effects and consequences of introduced disease, but the underlying theme is one of guilt and victimization. This theme extends to modern historians, it seems, for Watt refers to historians having to "admit" to certain facts: "most epidemiologists and historians admit that in the absence of smallpox pathogen, pre-Columbian peoples had no opportunity to develop immunity to the disease."[71] He also states that historians "*reluctantly admit*" that epidemic diseases like measles and smallpox were absent from the New World before contact.[72] Presumably, a historian would only be reluctant to admit this fact if they felt some sense of guilt or responsibility. Watt must feel that historians are part of some greater scheme to hide the truth or that historians are themselves members of the guilty parties.

Who are the 'guilty' parties? In Watt's book, guilt is restricted to the people he calls "the whites". A value-laden term, this label is as disturbing as calling aboriginal peoples "red men". Throughout the book, "the whites" are held responsible for all disease transmission. Watt goes so far as to absolve all "persons of colour" for any role in the introduction of disease to the New World. Documentary evidence points to an African slave as being the first person in the Americas to have had smallpox, thus making him a vector for further transmission. Watt, relying on the written record for all other evidence in his study, claims this documentation to be "circumstantial, based on hearsay and

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[70] Watt, *Epidemics and History* (1997)
[71] *Ibid.*, p. 84.
[72] *Ibid.*, p. 85 [my emphasis].

lacking elementary empirical worth."[73] He seems to believe that Africans, having had childhood experience with smallpox, were therefore all immune to the disease and could not have brought it to the New World. This statement is ludicrous. It demonstrates that Watt, for all his apparent understanding of disease processes, allows personal bias to colour his perception of the past. He does not seem to accept the fact that disease is a natural biological process and that one can not therefore cast blame where it is concerned.

Watts states that the "white slavers" had higher mortality rates from smallpox than their cargoes, a fact which should have made "the whites" as much victims of disease as African or aboriginal peoples. Watt does not give sympathy to "the whites", as if disease was not an unbiased biological process but simply a tool of imperialism. It is also interesting to note that Watt had made mention a few pages earlier that Europeans had immunity to smallpox since it was such a common childhood disease.[74] Would that make them also incapable of transmitting the disease? Quite the conundrum!

Published the same year as Watt's book, *Biological Consequences of the European Expansion, 1450-1800* is a much better example of how disease history should be treated.[75] Like Watt's study, however, the emphasis is on introduced disease, with little mention made of endemic or indigenous disease. The major difference between this volume and the previous study is the question of blame. Where guilt and blame are the underlying themes of Watt's work, the scholars whose articles appear within this text have attempted to keep personal opinions and agendas out of their analysis. The introduction to this volume considers why aboriginal peoples in the New World were not host to the same types of disease that Europeans had prior to contact. The editors point out that aboriginal peoples

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[73] *Ibid.*, p. 110.
[74] *Ibid.*, p. 103.
[75] Kenneth F. Kiple and Stephen V. Beck (eds.) *Biological Consequences of the European Expansion, 1450-1800* An Expanding World, Vol. 26 (Aldershot, Great Britain: Ashgate Publishing, 1997).

had left the Old World before the Neolithic Revolution, when the domestication of animals, increased agriculture, and a move towards urbanization led to contact with new varieties of disease. In an interesting shift of perspective, they also point out that Europeans were the first victims of the biological consequences of expansion. European sailors had increased incidences of scurvy, and the first European explorers to new lands fell ill when exposed to diseases for which they had no acquired immunity.[76]

Kiple and Beck, the editors of the volume, also considered the problem of data sources. While many of the articles in this compilation are based on archaeological or anthropological data, the issue of the reliability of the written word was also examined. While there are no documentary data for the pre-contact period, it does figure prominently in the early post-contact period. The editors of the volume believe attempting to diagnose a disease from descriptions in the written records to be a risky proposition. Their example is the way in which measles and smallpox may be described in the same fashion, making it difficult to distinguish between the two in the documentary record.[77] They do not overtly promote the use of physical data to solve this problem. The editors themselves make the statement that there were "doubtless...hepatitis and polio, as well as a variety of internal parasites... encephalitis, arthritis, pinta and tuberculosis" in the pre-Columbian New World, without providing any solid evidence of how they reached this conclusion. It strikes me as the way in which historians of disease have made the same kind of assertions, without looking for the physical evidence to back them up. This seems to be a problem intrinsic in the histories we have surveyed — educated guesses regarding the history of disease are proposed and no further effort is made to determine whether the assertions are valid.

There does seem to be an indication that the tide may be turning. More recent studies have shown that historians may be realizing that the documentary record is

[76] Kiple and Beck (eds.) *Biological Consequences of the European Expansion (*1997), p. xvi.
[77] Kiple and Beck (eds.) *Biological Consequences of the European Expansion*, p. xx.

too limited to rely on. Robert Boyd, the author of *The Coming of the Spirit of Pestilence: Introduced Infectious Disease and Population Decline Among Northwest Coast Indians, 1774-1874,*[78] is among the new breed of historians who recognize the value of archaeological data sets for studies in disease history. There are other reasons to remark upon this text: it is notable in that Boyd proves himself to be an historian who has learned the valuable lesson of removing issues of blame and guilt from discussions of natural biological process such as disease. An historian, aware of the nature of disease, can no more cast blame on the vectors of disease than they can blame a tree for losing its leaves. Human beings, as vectors, can not be held responsible for the unintentional spread of disease any more than a mosquito carrying malaria. Most incidences of epidemic disease introduced to the New World were no more intentional than the introduction of weeds from the Old World.[79] Boyd appears to recognize this fact and he focuses his study on the facts, rather than the emotions, of introduced epidemic disease.

Unlike many other historians, Boyd reflects on the probability of aboriginal peoples suffering the effects of internal parasitic disease. These illnesses are notoriously difficult to interpret in the documentary record. With few or no external symptoms, the complaints of stomach pain, fever, coughing or fatigue may easily be overlooked or viewed as symptomatic of other diseases. Even more noteworthy is that Boyd proposes a list of parasitic diseases that pre-Columbian aboriginal peoples may have had.[80] In using modern examples of parasitic disease transmission, he may be accused of up-streaming, yet there are strong links between the modern examples and the potential for diseases that Boyd has proposed. For example, salmon are known to carry parasites and to infect modern aboriginal peoples, and it is entirely conceivable that this happened in the past as well. However, his arguments are weakened by not providing any actual evidence

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[78] Robert Boyd, *The Coming of the Spirit of Pestilence: Introduced Infectious Disease and Population Decline Among Northwest Coast Indians, 1774-1874* (Vancouver: University of British Columbia Press, 1999).

[79] For an enlightening and highly readable discussion of 'weeds' as an introduced factor, see Crosby "Weeds" (1986), pp.145-170.

of this. He also tends to contradict himself, when he states that the mobility of hunter-gathers protected them from parasitic diseases, but three pages later suggested that they may have been subjected to such diseases from poorly prepared food.[81] If Boyd had used data from the archaeological record, these inconsistencies might have been cleared up. However, this crucial step is not taken, leaving this text short of being a thorough and interdisciplinary study, and leaving gaps in the field of disease history.

Conclusion

It is unfortunate that historians have not fully demonstrated the role that disease has played in history. While the literature review does show references to illness, it also illustrates how little work has been done outside the realm of obvious, highly mortal introduced epidemic diseases. The historiography indicates that epidemic, rather than endemic, disease has been considered to be an appropriate subject of study. In considering why this is the case, the author can only come to the conclusion that since epidemic diseases are more likely to appear in the documentary record, these are the types of disease that are selected for study by historians. The discipline of history has at its core a tendency to rely heavily on the written word. It is this factor that seems to be used as an indicator of which diseases are acceptable for study. It does, however, also render a vast number of diseases historically invisible. This is a serious omission, and it is one that seriously weakens our state of historical knowledge. To selectively analyze epidemic disease to the exclusion of endemic disease results in distorted scholarship. It is rather like studying a war without having a basic understanding of the political, economic and cultural systems of the two opponents. Indeed, historians have been able to paint an interesting picture of a special event, but what of our state of knowledge of long-term events?

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[80] Boyd, *The Coming of the Spirit of Pestilence* (1999), p. 279.
[81] *Ibid.*, p. 9 and 12.

The historiography discussed above demonstrates this problem. The broad, nationalist histories, which focus heavily on the political and economic state of the nation, refer to disease only when it affects or corrupts these institutions. Earlier works, such as Morton (1939), are obvious in their racist and ethnocentric viewpoints, and the reader does not expect to find any information regarding the effect of illness of Native communities; really, one does not find much regarding aboriginal peoples in the primary narrative. Here, disease is mentioned as an interesting side-note to the creation of the Canadian nation, and is used to explain the disappearance of aboriginal peoples in the post-contact New World. In many ways, disease is used as a justification — as a means of showing the supposed superiority of the Euro-Canadian peoples. Later authors such as Creighton do not move much beyond this. These historians, being a product of their times, give little consideration to the topics that would later find a place in the field of social history.

Fur trade scholarship has experienced this same division. Early works, as represented by Innis, paid more attention to the political and economic spheres, and paid little mind to the so-called 'social factors'. While there is an implicit understanding that aboriginal people were affected by introduced disease, the epidemics that spread across the New World are again only mentioned when they have had a negative impact on trade. With the genesis of social histories, more attention was paid to the cultural factors influencing the fur trade. Beginning in the 1970s, more attention was paid to the question of disease. A number of historians and historical geographers, such as Ray, have made good use of the available documentary data and provided some interesting insights into the spread of epidemic disease during the fur trade period and the resulting social upheavals. But these studies tend to focus on introduced disease and give the reader no clue as to the prevalence or effect of endemic disease. They also tend to analyze the problem from the Euro-Canadian point of view, and they omit a meaningful discussion of an aboriginal understanding of the cause and treatment of illness.

If omission is a sin, then surely using disease as an instrument of blame is another, larger one. Historians like to believe that through our training, we are schooled not to assign blame, to pursue an agenda, or to use the past to point accusatory fingers. It appears, though, that some historians do believe that 'two wrongs make a right', and blatantly have used disease as a method of assigning guilt. This is especially clear when one evaluates how disease data is presented in the field of Native history. Little attempt is made to disguise the agenda behind the selection of historical facts and the interpretation of these facts is often done in a manner that upholds the agenda of blame and guilt. In this type of writing, disease is presented as an invisible hand of imperialism, a tool that was used by Europeans to intentionally destroy New World peoples. To support this hypothesis, historians working with this agenda have proposed a state of affairs before contact, and in doing so have created a mythical disease-free utopia. Not only is this poor scholarship, it is entirely wrong. Physical data exist that clearly demonstrate the presence of disease in pre-contact New World societies. These data have been ignored or misinterpreted to support the ideological agenda. In this 'politically correct' age, it is deemed inappropriate, or perhaps academically risky, to refute these ideas and agendas. However, in the interest of better scholarship and of a clearer picture of the past, these interpretations and assumptions must be challenged. Trigger has pointed out a dichotomy between the fields of anthropology and history, which may be assumed to be part of the problem.[82] The resolution of this dichotomy is a necessary first step in determining the presence, and understanding the role, of disease in pre- and post-contact Native populations.

If Canadian historiography is somewhat void of meaningful discussions of disease, the literature pertaining to the history of medicine would, on first glance, give the reader hope that such a difficult topic would be more thoroughly handled. But, again, use of documentary record appears to have limited the scope of

[82] Trigger, *Natives and Newcomers*, p. 5. Also see Verano and Ubelaker (eds.) "Introduction", in their *Disease and Demography in the Americas* (1992), p. 1.

investigation. It leads to the conclusion that disease in history is not the same as the history of medicine. Generally, the epidemics are handled carefully, although it is regrettable to find that they may still be used as a mechanism of blame and guilt, as in Watt's text. Overall, historians of medicine make the effort to evaluate the effects of disease on society, and place these within a historical framework. Still, one is left with the feeling that historians have missed a significant piece of the disease puzzle.

Several issues arise from the examination of the historical recorded pertaining to disease in the New World. The major point is that historians have not been as thorough as they can be in the analysis of disease in the Americas. With the exception of newer studies like Boyd's, few historians have attempted to examine incidents of endemic disease; even fewer have attempted to speculate on the state of pre-contact disease.

The problems inherent in text-based forms of research justify looking beyond the discipline of history to other methodologies and data sets. To gauge the effect of introduced disease, one must first evaluate the types of disease that were present in the Americas before European contact. This is necessary in order to demonstrate the 'virgin-soil' effects of introduced disease. By understanding what disease were already present in the New World, we can have a greater appreciation of the devastating impact of diseases for which populations had no prior immunity or experience. To compile a database of indigenous disease, the historian must turn to the social sciences and to the disciplines whose work with physical data sets allow for the collection of information from pre-contact sources. In this way, the historian will not be constrained by the limits of the documentary record. Physical data is not bound by the same restrictions as the written record – there is no agenda behind what is left in the ground. Documentary or iconographic data tends to be subjective and based on attitudes, opinions and preferences which, according to Roberts, may be due to a failure in

understanding the nature of the disease itself.[83] That is, if the disease is not understood, it can not be accurately represented with words or images. Historical sources such as documents should then be viewed (from the point of view of their evidentiary reliability) as secondary sources rather than primary sources, and used as such. The fields of physical anthropology and archaeology are able, in fact, to provide the historian with primary data of pre-contact disease, as we shall see.

[83] Charlotte Roberts and Keith Manchester, *The Archaeology of Disease* Second Edition (Ithaca, New York: Cornell University Press, 1997), p. 2.

Chapter Three
Physical Data and Historians

> *If, as it is said, one can tell much about man's way of life from the contents of his garbage can, then one may indeed be able to tell even more from the contents of his latrine.*[84]

This chapter is an illustration of how archaeological and anthropological data can be used effectively to shed light on specific health disorders in pre-contact and contact-period populations. It will examine the role of archaeological and anthropological materials in an examination of the health of past populations and explore its application to the field of history. Specifically, it will present the theoretical and practical methods of using physical data to determine the incidence of parasitic disease in historic peoples. As these data are shared between disciplines, an increased understanding of past health and disease issues will result.

As the previous chapter has demonstrated, the disease history of pre-Columbian aboriginal peoples has been largely unexplored in the field of historic enquiry, and that of the post-contact period has not been thoroughly analyzed. It appears that historians have been reluctant to pursue the topic because of their disciplinary reliance on the documentary record to the near exclusion of other sources. The documentary record may only provide limited insight into disease and the resulting information is typically anecdotal and episodic, and thus it can be difficult to use to build reliable large-scale assessments. This is a particular problem when investigating disease in the pre-Columbian and early contact period in the New World. No documentary data exist prior to contact, rendering everything 'historically invisible' *if* one insists on relying on the written record alone. The presence of written records in the early post-contact period is not a guarantee of meaningful data either. Ramenofsky has noted that, "European medical knowledge was not well developed in the early centuries of ... contact,

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[84] Peter D. Moore, "Life seen from a medieval latrine" *Nature* Vol. 294 (1981), p. 614.

and colonists were naïve regarding their microbial imports."[85] Further, if scholarly assumptions are correct about the spread of disease and its associated social upheaval decimating aboriginal populations before the first physical contact with Europeans, then documents created at this time recorded social and cultural abnormalities.[86] With extreme mortality rates, the first virgin-soil epidemics would have thrown individual social and larger cultural groups into chaos. The first records created on these groups, then, would have recorded not the ways of life that had always been, but societies in turmoil. As Ramenofsky has noted, "The historical record of Native Americans, therefore, must be approached from an assumption of change rather than stability."[87] This has repercussions when one attempts to use these documents to describe the traditional, normative lifeways of these past peoples. To resolve this problem, the addition of archaeological and physical anthropological data is necessary. This interdisciplinary approach is advantageous to the historian examining disease history, but it should not be assumed as fail-safe. While there are advantages to working with more than one method or data type, the final end product is merely more information. As ever, it remains up to the scholar to make sense of the data, be they texts or artifacts.

Many diseases leave no mark on the human skeleton or in archaeological contexts. Mummified human remains are a more profitable source of information regarding diseases of the skin and soft tissues but these types of remains are rare. For the purpose of this thesis, a case study in disease history was sought that could illustrate how an interdisciplinary investigation of health could be conducted. The issue of parasitic disease in New World aboriginal peoples is an excellent way to demonstrate the role that physical evidence may play in historical enquiry. The physical remains of human parasites are a primary form of medical evidence recovered from archaeological contexts and from human remains. Whether recovered from a human mummy or skeleton or recovered from

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[85] Ann F. Ramenofsky, *Vectors of Death: The Archaeology of European Contact* (Albuquerque: University of New Mexico, 1987), p. 138.
[86] Ramenofsky, *Vectors of Death,* (1987), p. 174.

archaeological materials, this form of data can be used to present a more complete picture of the health of past peoples. Gooch has provided a clear argument why an understanding of parasitic disease is important:

> At the root of social organization lies economics and at the root of economics, ergonomics and performance. The continued drain of energy consequent on a chronic parasitic infection may be seen as a kind of tax ...You not only have to support your extended family but your extended parasites as well ...[parasitic infections] may not be as dramatic as the Black Death or a cholera epidemic, but it seems reasonable to assume that they were a fairly constant limiting factor in the development of any ancient society.[88]

Current data from the World Health Organization states that intestinal parasites and protozoan infections are amongst the most common infections world-wide. They estimate that 3.5 billion people are affected by parasitic disease, and of these, 450 million are ill as a result of parasites.[89] If these figures reflect the number of people who host parasites in spite of modern medical treatment, one can only imagine the number of people affected by parasitic disease in the past. Using physical data, the historian is able to find evidence of these diseases that affected pre-Columbian peoples. A basic knowledge of pre-contact aboriginal health is also necessary for historians to understand the effects of epidemic diseases subsequently introduced.

Errors and misinterpretations have evolved from document-based research in the disease history of parasites suffered by New World aboriginal peoples. Until recently, many historians believed that many of the more common types of human-specific parasites were historic introductions to New World peoples. In 1981, Robert Desowitz stated that the pinworm, or *Enterobius vermicularis*, was the only human-specific helminth parasite among New World populations.[90]

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[87] Ramenofsky, *Vectors of Death*, p. 174.
[88] Peter S. Gooch, "Helminth Parasites" in Gerald Hart (ed.) *Disease in Ancient Man* (Toronto: Clark Irwin, 1983), p. 209.
[89] World Health Organization website – http://www.who.int/ctd/html/intestburtre.html
[90] Robert S. Desowitz, *New Guinea Tapeworms and Jewish Grandmothers: Tales of Parasites and People* (New York: W.W. Norton, 1987)

Robert Boyd is representative of the body of historians who assume that aboriginal peoples, because of the mobility of small groups, were not host to parasitic disease.[91] This is an unfounded hypothesis, but one that has survived in the historiography despite a growing collection of physical data that proves otherwise. Archaeological and physical anthropological data demonstrate that human parasitism in the New World is of great antiquity. Virtually every species of parasite presently endemic in modern New World populations have been recovered from prehistoric contexts, including those human parasites previously considered introductions to the aboriginal peoples during the historic period. The oldest evidence, recovered from desiccated human fecal remains, date to about 10,000 BP,[92] almost as far back as the human archaeological record extends in the New World, and far earlier than dates provided in the archival record.[93]

The indigenous origin of parasitic disease in the New World conflicts directly with the belief that most parasitic species, like the viral and bacterial epidemic diseases, were introduced to aboriginal peoples after contact. This belief is based upon a hypothetical "cold screen", created by the migrations across Beringia, which is presumed to have killed off parasites who rely on temperate climates.[94] Colder temperatures, or the absence of appropriate vectors along this migratory route, could certainly affect the ability of an organism to survive. But this belief makes three assumptions: that the migrations lasted longer than the reproductive life of parasites already infecting the host; that the parasite was not also present in other vectors in the New World; and that the migrations did indeed take place along this northern route, a fact which is debated by archaeologists. *Trichuris trichiura*, a common parasite of man, is hardy and long-lived, averaging 5-10 years for a single worm. It is also closely related to *Trichuris vulpis*, a parasite of

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[91] Boyd, *The Coming of the Spirit of Pestilence* (1999), p. 9.
[92] *Before Present*, 'Present' considered to be the year 1950 for the purposes of carbon 14 dating.
[93] Recovered from Hogup and Danger Caves in Utah, these coprolites contained the ova *of Enterobius vermicularis* and *acanthocephalans*. See K.J. Reinhard "Archaeoparasitology in North America" *American Journal of Physical Anthropology*, 82 (1990), p. 159.
[94] M.M. Kliks, "Helminths as Heirlooms and Souvenirs: A Review of New World Palaoparasitology" *Parasitology Today*, 6(4), (1990), p. 96.

dogs, which may have been shared between the two species as they traveled. This would make the dog a convenient vector for disease, and one that shared the same mobility as the small groups of aboriginal peoples. Where the people went, so too would this vector. M.M. Kliks has proposed that aboriginal peoples would have encountered both "heirloom" parasites, brought along with them from the Old World, and "souvenirs" encountered in the New World. One wonders what kind of parasites were spread from now-extinct New World megafauna like the woolly mammoth.[95] In any case, parasitic disease *was* present in the pre-Columbian human populations, and data exists of these diseases that may be used by the historian. A discussion of how parasites are recovered, and from what contexts, will help the historian to understand the nature of this physical data.

Methodologies

In North America, the examination of mummies, skeletons and of the coprolites and soils removed from archaeological sites, are typically done by parasitologists or pathologists, or by anthropologists with training in parasitology and in consultation with parasitologists.[96] In South America, parasitologists and pathologists are the only ones to do archaeoparasitological research. As a result, diagnosis is more rigorous in South America, but parasite data are more often placed in a cultural context in North America.[97] This is an important distinction for the field of history. Raw data must be placed in a cultural context to give it meaning for historical purposes. Thus, research conducted by an archaeologist will assist the historian to give parasite data meaning within the scope of historical enquiry.

Besides showing the presence or absence of disease in a population, does the recovery of parasites or their eggs give us insight into the health of past peoples?

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[95] Kliks, "Helminths as Heirlooms and Souvenirs", 6(4), (1990), p. 93.
[96] K.J. Reinhard, "Archaeoparasitology in North America", *American Journal of Physical Anthropology*, 82, (1990), p. 145.
[97] Reinhard, "Archaeoparasitology in North America", *American Journal of Physical Anthropology*, 82, (1990), p. 145.

Again, a discussion of the concept of 'up-streaming' is important. Ann Ramenofsky, in her *Vectors of Death: The Archaeology of European Contact*, cautions against using modern disease and its symptoms as an analogue for historical disease, believing this to violate the principles of evolution.[98] As an example, she points to the vast differences between the experience of syphilis in the sixteenth century and in modern populations. In its 'virgin soil' state, the disease had horrific symptoms, killed quickly and had a high mortality rate. The experience of syphilis today is vastly different. If an historian were to compare a list of symptoms from these two experiences, they might conclude that two different diseases were represented. This is a good reminder to historians, who tend to assume biological continuity when examining disease. Disease may not always be a static process. However, viruses and bacteria have been proven to mutate and to evolve, whereas the ova and remains of parasites appear unchanged over millennia. Unlike viruses and bacteria, there is no acquired immunity to parasitic disease, making their mutation or evolution unnecessary. This may indicate that human reaction to these organisms has also remained unchanged. Therefore, one may safely assume that the human body's response to parasitic disease, and the effects of parasitic disease upon the human body, was the same in the past as it is now. This means that historians may explore the effects of parasitic disease upon an individual or a community, based on the physical evidence of such diseases.

Physical evidence of past human parasitic disease may be recovered from two different sources — from the remains of human bodies and from archaeological contexts. A distinction can be made between palaeopathological data, or that recovered from human remains, and archaeoparasitological data, which in practice is recovered from archaeological contexts. However, there is often a very fine line between archaeological and palaeopathological data, as mummies and skeletal remains are often regarded as part of an archaeological assemblage.

[98] Ramenofsky, *Vectors of Death*, pp. 137-138.

While the two data sources have been considered separately in this thesis, evidence from the two together may appear together in archaeological or anthropological literature, and very often data are described using the same terminology. For the ease of the reader, however, archaeoparasitological and palaeopathological information will be considered separately below.

Palaeopathology, in practice, can be defined as the science of diseases whose existence can be demonstrated on the basis of human and animal remains from ancient times.[99] The word palaeopathology implies both that the period of study is 'the past' (*palaeo*)[100] and that the study investigates disease processes (*pathology*). Pathology itself is the study (*logos*) of suffering (*pathos*).[101] According to Roberts, the study of palaeopathology examines the evolution and progress of disease through long periods of time and examines how humans have adapted to changes in their environment. These are topics that interest historians as well. Bound by this common thread, historians and palaeopathologists are able to share data and benefit from advances in other disciplines: historians from the physical data studied by palaeopathologists who, in turn, utilize information from the documentary and iconographic record and the interpretations of historians.

Archaeoparasitology is an offshoot of palaeopathology, and it is based on the same principles of combining biological and cultural data in an holistic approach for the investigation of cases of human disease in the past. The study of human parasitism through the analysis of archaeological materials has proven to be a successful method of determining the presence of this disease in past populations. The study of coprolites and of latrine soils for evidence of human parasite remains has grown rapidly in the past decades, and has been a boon to historians investigating disease, both in individuals and at the population level. Such

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[99] Roberts and Manchester, *The Archaeology of Disease*, Second Edition (Ithaca, New York: Cornell University Press, 1997), pg. 1.

[100] Note the discussion below of the problems surrounding the use of the prefix 'palaeo'. As the field of palaeopathology has a long-standing use of this label, dating to 1910, it will be used in this study, and will refer to both pre-Columbian and post-contact materials.

analysis relies on the fields of history, archaeology and parasitology. Because of its close relationships with all these disciplines, there has been confusion and debate over terminology and confusion about the name of this field of study. Karl Reinhard has provided an excellent discussion on the terminology used in this research.[102] Many scientists have used the term "palaeoparasitology", but Reinhard notes that this name is problematic for two reasons. First, the term "palaeo" has a specific meaning in the field of archaeology. Referring to North American megafauna hunting cultures, this term is applied to sites where materials have been dated between 11,500 and 9,000 years BP. Additionally, the term "palaeoparasitology" would exclude materials recovered from post-contact sites. Reinhard prefers the term "archaeoparasitology" in that it can refer to both ancient and more recent materials. For these reasons, the term "archaeoparasitology" will be used in this study.

This chapter is structured so that archaeoparasitological data will be considered first, followed by data from palaeopathological investigations. The analysis will progress from the most general type of data to the most detailed and specific. For each field of study, exemplary works of research will be summarized to provide an introduction to the methods, results and the limitations of that field. This will be followed by remarks on the historical applications of that type of data.

Archaeoparasitology: An Introduction

Archaeoparasitology, as a method of research, began as an offshoot of early palaeopathological and archaeological research in Western Europe. During processing for dietary research, samples from preserved human coprolites were recognized as containing human parasite remains, including both adult worms and ova. This field of study was slow to catch on. It was not until the 1950s that scientists began specifically to search for and utilize archaeoparasitological data. The literature indicates that most of the research in this field has been conducted

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[101] Roberts and Manchester, *The Archaeology of Disease* (1997), p. 1.
[102] Reinhard, "Archaeoparasitology in North America", p. 145.

in Europe, although the majority of studies of preserved human coprolites have been carried out on samples from the arid southern United States.

In Canada, the study of archaeoparasitology has been even slower to take off. The first studies of this type did not take place until the mid-1990s. The first reported case of human parasites recovered in an archaeological context was Patrick Horne and James Tuck's 1996 study of latrine features on a seventeenth-century colonial site in Newfoundland.[103] In 1996, I collected soil samples from the Fort George Historic site, a late-eighteenth century fur trade post in Alberta, and from sites FfQh-2 and FfQh-6, salvage excavations on the proposed Cheviot mine lease lands east of Jasper National Park, Alberta, which represented early twentieth century logging camps. In an unpublished Parks Canada report, I also analyzed possible human coprolite samples from an archaeological context in the Gwaii Haanas National Park Reserve and Haida Heritage Site in British Columbia.[104] Archaeologists and anthropologists are slowly recognizing this type of research to be an invaluable, and unparalleled, tool for researching and understanding human parasitic disease in past populations. Historians, not being familiar with these data sets, have yet to recognize the validity and value of this data.

Due in part to issues of preservation, archaeoparasitological research is limited to the study of human helminth and arthropod parasites. Helminths include *trematodes* (flukes), *cestodes* (tapeworms), *acanthocephalans* (thorny-headed worms) and *nematodes* (roundworms). Helminths have very durable eggs and larvae, and thus are the parasites most commonly recovered from archaeological contexts. Adult nematodes have a tough exterior cuticle, which often allows for their preservation in coprolites and soils. The body structure of adult cestodes, trematodes and acanthocephalans is delicate; they have not therefore been

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[103] Patrick D. Horne and James A. Tuck "Archaeoparasitology at a 17th Century Colonial Site in Newfoundland", *Journal of Parasitology* , 82(3) (1996), pp. 512-515.

[104] Shelly Funston, An Examination of Samples from Site 1283T Gwaii Haanas National Park Reserve and Haida Heritage Site, For Evidence of Parasitic Disease (Unpublished: Parks Canada, 1998)

recovered from archaeological contexts. Of the arthropod parasites, the most common variety found on archaeological sites are head lice, as eggs cemented to the hair of mummies and skeletons, or as adult lice recovered from coprolites.[105]

Poor preservation is only one of the issues that plague the study of archaeoparasitology. "False parasitism" is a further problem that researchers must be aware of. False parasitism refers to finding eggs or remains of a parasite species in a host that is not susceptible to infection by that particular species.[106] In humans, false parasitism can occur when the eggs of a parasite are consumed through contaminated food. Designed to pass through the digestive tract undamaged, ova from non-infective parasites can thus be recovered in mummified human remains, in human stools preserved as coprolites, or in soils recovered from cultural deposits. Zimmerman reported finding the eggs of *Cryptocotyle lingua*, a fluke that infects fish, in the colon contents of a 1,600 year old frozen human mummy recovered on St. Lawrence Island, Alaska.[107] Reinhard notes that true infections of this parasite are not found in humans, but eggs of this species can be readily introduced to the human digestive system through the consumption of infected fish.[108]

False parasitism can usually be identified in cases such as the one mentioned above, where species can be easily identified and differentiated. Greater difficulty ensues when two species of parasites have similar ova. Then, accurate identification of the species of parasite becomes more problematic. An example of this is the similar forms of the human parasite *Trichuris trichiura* and *Trichuris suis*, a parasite of pigs. Assumptions about which animal produced a stool may

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[105] Reinhard, "Archaeoparasitology in North America", p. 146.
[106] *Ibid.*, p. 147.
[107] Zimmerman, M.R. "Aleutian and Alaskan Mummies" in A. Cockburn and E. Cockburn (eds.), *Mummies, Disease, and Ancient Culture* (Cambridge: Cambridge University Press, 1980), p.119.
[108] Reinhard, "Archaeoparasitology in North America", p. 147.

bias the investigator in the identification of parasite ova.[109] If the researcher assumes that a stool was produced by a human, a whipworm egg may be identified incorrectly as that of *Trichuris trichiura*, the human parasite, when it actually was that of *Trichuris sius*, the species found in pigs. This problem must also be considered when identifying samples from latrine deposits. Latrine facilities often served as a more general refuse depository, and may therefore have been subject to the disposal of infected animal wastes, complicating the identification of parasite ova recovered from these features.

The following is a discussion of the two sources from which archaeoparasitological data may be recovered — from coprolites and from soils — and includes a brief background to the methods and results of each field of study. As coprolites were the first source to be recognized as containing human parasite remains, it will be considered first.

Archaeoparasitological Data from Coprolites

The English geologist William Buckland coined the term 'coprolite' in 1829 to describe the fossilized feces of dinosaurs.[110] Found desiccated on arid archaeological sites, frozen, or preserved in waterlogged sites, coprolites can be easily recognized as individual stools by their shape. The form of a coprolite, and the assemblage of parasite ova recovered, may indicate the species that produced the sample. Most of the archaeoparasitological work that has been done to date falls into the realm of coprolite analysis. Largely a development of North American archaeology, the study of human feces preserved as coprolites has proven to be an excellent technique for providing parasite data. Coprolites are one of the most useful materials with which to analyze the state of parasitic disease in past human populations. B.H. Young, an American archaeologist working in

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[109] A.K.G. Jones, "Human Parasite Remain: Prospects for a Quantitative Approach" in A.R. Hall (ed.), *Environmental Archaeology in the Urban Context* (Council for British Archaeology Research Report No. 43, 1982), p. 67.

[110] Patrick D. Horne, " A Review of Human Endoparasitism in the pre-Columbian New World Through the Study of Coprolites" *Journal of Archaeological Science*, 12 (1985), p. 299.

Kentucky, is credited with the first report made in 1910 of isolated human coprolites in an archaeological context.[111] From 1910 to the 1960s, few papers were published on human coprolites from an archaeological perspective, and those published were primarily concerned with analysis of prehistoric diet. Diet was the initial consideration for examining coprolites, but this study evolved to include other aspects of anthropological research, such as palaeoecology. This thesis, however, will refer only to the knowledge gained in the study of human health.

Human coprolite remains are generally only recovered from extremely arid sites, such as those in the American Southwest, a fact that limits their potential for recovery in many parts of the world. As noted above, coprolites may also be recovered where they have been frozen or in waterlogged sites, but little work has been done on these types of sites. Coprolites collected from cave sites generally have the best preservation of helminth ova and larvae. Coprolites from more open sites are usually less well preserved, so parasite remains from these samples can be partially decomposed and thus are harder to identify.[112] The eggs of *Enterobius vermicularis*, commonly known as pinworm, are specifically noted as being prone to decomposition, especially those from coprolites found on open-air sites.[113] Pinworm ova may be recovered from samples collected from protected sites such as caves. Pinworms are exclusively human parasites that lead a direct and simple life, which contributes to the high infection rate of this endemic parasite. The Center for Disease Control in Atlanta notes that the eggs of pinworm are rarely found in stool samples. Therefore, the infection burden in an individual would have been relatively high for the ova of this species to be present in a coprolite.[114] Of those that are found in stools, they must be adequately preserved, and be collected by an investigator during processing. The rare combination of these

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[111] Horne " A Review of Human Endoparasitism in the pre-Columbian New World Through the Study of Coprolites" (1985), p. 299.
[112] Reinhard, "Archaeoparasitology in North America", p. 147.
[113] *Ibid.*, p. 147.
[114] Center for Disease Control Website – http://www.cdc.gov/ncidod/dpd/parasites/pinworm/

factors may result in few cases of these parasites being identified in archaeological materials, and thus an under-representation of this disease. However, pinworm ova have been recovered from coprolites from all through the American Southwest and from coprolites in the South American countries of Chile, Argentina and Peru, indicating that this parasite was endemic in aboriginal populations.[115] The eggs of *Enterobius vermicularis* have also been recovered from coprolites in Hogup and Danger Caves in western Utah. Dated to approximately 7837 BC and 4010 BC respectively, these studies have established pinworm as the oldest parasitic remains recovered from human coprolites.[116]

Certain parasites, such as *Trichuris trichiura*, *Ascaris lumbricoides* and hookworm are difficult to recover in coprolites. This probably occurs because these species of parasites require moist environments to complete their lifecycles; the deserts in which most coprolites are recovered are not conducive conditions for these genera.[117] *Trichuris trichiura*, commonly known as the whipworm because of its thin anterior body, needs high temperatures, high humidity and moisturizing retaining soil to reproduce. These conditions are not conducive for the preservation of coprolites. There however has been a report of *Trichuris* ova recovered from a coprolite in the arid region of the American Southwest, indicating that this species, while not commonly preserved, was present in past populations of this area.[118] *Ascaris lumbricoides*, or the giant roundworm, currently has a worldwide distribution. The World Health Organization estimated 650 million people had this parasite in 1998.[119] Such staggering numbers, in spite of modern medical treatment, indicates that *Ascaris* was likely to have been a much greater problem in the past; more research, however, needs to be done on this subject.

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[115] Horne, " A Review of Human Endoparasitism in the pre-Columbian New World Through the Study of Coprolites", p. 300.
[116] *Ibid.*, p. 301.
[117] Reinhard, "Archaeoparasitology in North America", p. 159.
[118] Horne, " A Review of Human Endoparasitism in the pre-Columbian New World Through the Study of Coprolites", p. 302.
[119] World Health Organization website – http://www.who.int/ctd/html/intestepidat.html

Archaeoparasitological Data from Soils

Relatively few latrine studies of archaeoparasitological data have been conducted in North America, as this type of data can only be recovered from sites where controlled or contained sanitation practices were carried out. The validity and potential for results from archaeoparasitological study has made this research of more interest to historical archaeologists or historians interested in post-contact history.[120] Such sites may not be of particular interest to historians considering the problem of pre-Columbian or early post-contact aboriginal history, but a short discussion of the parasite data from soils will be made here. Discernable by the presence of highly organic soils, latrines or privy features are a common feature in historic period archaeological sites. Latrines discovered on historic sites often provide good conditions for the preservation of human parasite ova, with the exception of fragile *oxyurid*[121] eggs such as those of the pinworm, which are susceptible to decomposition in latrine environments.[122] As stated above, helminths have very durable eggs and larvae, and adult nematodes have a tough exterior cuticle, which often allows for their preservation in coprolites and soils. The ova of most internal parasites are designed to pass unharmed through the digestive tract of their host, a fact that ensures their preservation in archaeological contexts.

Human parasite ova recovered from archaeological deposits were first reported from Taylor's 1955 excavations of a wood-lined medieval pit at Winchester, England. Large numbers of eggs from *Trichuris trichiura, Ascaris lumbricoides* and the fluke *Dicrocoelium dendriticum* were collected from soils at this site. Pike and Biddle worked on this same site in the early 1960s. In a similar wood-lined pit, they noted a "dark, green-brown deposit which was distinctly layered and compacted into a solid mass". [123] This material represented human waste

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[120] Reinhard, "Archaeoparasitology in North America", pp. 146-147.
[121] *oxyurid* refers to the nematode order that includes pinworms.
[122] Reinhard, "Archaeoparasitology in North America", p. 147.
[123] A.W. Pike and M. Biddle, " Parasite eggs in medieval Winchester", *Antiquity*, 40 (1966), p.294.

materials, flora remains and faunal materials. The parasite ova were well preserved, due to the waterlogged state of the site, and thus it was possible to identify the remains of embryos within many of the eggs. This study proved that "under suitable conditions organisms are preserved which could provide valuable information about the health and environment" of past peoples and sites. [124]

Trained in both archaeological and historical research techniques, I undertook a study of soils from both a fur-trade post and a twentieth-century logging camp to test the potential for an historian to conduct primary research in the field of disease history. Appendix "A" of this thesis contains the particulars of the collection and analysis of soil samples from these two sites. Most historians will not be able to hold a permit to remove samples from an archaeological site and will consequently have to rely on collection done by professionals in this field. However, a historian with a minimal amount of training and access to laboratory facilities may conduct the lab analysis. My own work involved the collection of soil samples from the Fort George site (1792-1800) in Alberta, and the analysis of these samples and soil samples from two 1930s era logging camp sites on the Cheviot Mine lands near Hinton, Alberta. All three samples were recovered from what were tentatively identified as latrine features, making the potential for the recovery of parasite remains greater. With the assistance of Alan Shostak of the Department of Biology at the University of Alberta, the ovum of what was identified as a possible *Ascaris lumbricoides* was recovered from one of the Cheviot sites. While not conclusive, it does point to the potential for this type of data to be recovered by an historian with little training or experience in the laboratory sciences.

Palaeopathology

The study of palaeopathology may provide primary evidence for the state of health of past peoples. Evidence is gained from the study of skeletonized or mummified human remains, with contemporary documents and iconographic data

[124] Pike and Biddle, " Parasite eggs in medieval Winchester", *Antiquity*, 40 (1966), pp.294-295.

utilized where appropriate. As such, palaeopathology takes a *biocultural* approach – combining biological and cultural data in the process of investigating past health issues.[125] Palaeopathology, as a science, has its roots in the eighteenth century study of 'interesting' cases of non-human disease. The examination of animal bones led to a refinement in techniques and a growing interest in human skeletal variation and evidence of disease.

Parasitological Data from Skeletal Remains

The palaeopathological study of human skeletons can provide excellent insights into the diseases suffered by past peoples. Many common diseases, however, leave no traces on bone. For example, the study of human skeletons rarely produces useful results for archaeoparasitological research. However, careful analysis during the excavation of human skeletal remains can reveal evidence of parasitic disease in the surrounding soils. Only one form of parasite can be recovered from this context, that being calcified tapeworm cysts.[126] These cysts are caused by the larval stage of the tapeworm *Echinococcus*, in which the parasite forms large cysts in human somatic tissue. Commonly called hydatid cyst disease, it is an example of a zoonosis, or disease of animals that is transmissible to humans. Evidence of this disease is recovered in the form of calcified cysts excavated with skeletons. D.J. Ortner and W.G.J. Putschar analyzed a female skeleton, pre-dating Russian contact, excavated from Kodiak Island, Alaska, which contained evidence of hydatid cyst disease.[127] The archaeological discovery of one single cyst can signal that many more individuals in the community were infected by the same disease, as only 2% of infected individuals in modern populations exhibit calcified cysts. Also, in archaeological contexts, there is the further possibility that cysts may not be recovered during excavation.[128] In the case of the Kodiak Island skeleton, the particular zoonosis was likely

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[125] Roberts and Manchester, *The Archaeology of Disease*, p.1.
[126] Reinhard, "Archaeoparasitology in North America", p. 147. Also see D.J. Ortner and W.G.J. Putscher, *Identification of Pathological Conditions in Human Skeletal Remains* (Washington: Smithsonian Contributions to Anthropology 28, 1981).
[127] Reinhard, "Archaeoparasitology in North America", pg. 147.

Echinococcus granulosus, a disease that can result from close association with dogs.[129] A further example of hydatid cyst disease was reported by Williams from skeletal remains recovered from a burial in North Dakota dating to approximately 1350 BP.[130] As with the data from Kodiak Island, a calcified cyst was recovered from a female skeleton, and appears to be of the parasite *Ech. granulosus*. Reinhard notes that this cyst was complete, whereas the sample from Alaska was not. In that case, it represents the only intact hydatid cyst recovered from a burial to date.[131]

Parasitological Data from Mummies

Parasitological data was first recovered from mummified human remains, and recent data from a mummified body in the Alps represents the oldest evidence of parasitic disease recovered from this context. In addition to the internal parasites, mummies are the best source of archaeoparasitological data for the arthropod parasites commonly called lice.[132] Rapidly desiccated or frozen human remains are the best conditions under which internal parasites can be preserved, and frozen mummified human remains containing parasites have made this among the first known diagnosed and treated diseases in the history of western medicine. Evidence and inference from the mummy of the "Ice Man" and his artifacts have revealed both parasitic disease, and what is believed to be medication for this disease. The well-preserved mummy of an adult male was recovered in 1993 melting out of a glacier in Northern Italy. Dated at 5,300 years before present, the mummy represents some of the oldest physical evidence of medical knowledge in the west, and indicates that people of his time had a system of medical diagnosis and treatment.[133] Professor Luigi Capasso of Italy's National Archaeological Museum reported in the British medical journal *The Lancet* that the Ice Man

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[128] *Ibid.*, p. 148.
[129] *Ibid.*, p. 147.
[130] J.A. Williams, "Evidence of hydatid disease in a Plains Woodland burial", *Plains Anthropologist*, 30 (1985), p. 25.
[131] Reinhard, "Archaeoparasitology in North America", pp. 148-149.
[132] *Ibid.*, pg. 146.

himself, or a tribal healer, likely recognized the nature of a disease he was suffering from, and had attempted treatment of it.

While complete "packages" such as the Ice Man are rarely found, mummified and skeletal human remains are perhaps our best tools for understanding the health of past peoples. For the historian, mummies are important sources of political, economic and social information. Much of the information derived from mummified human remains is unavailable in the sources commonly utilized by historians, such as written text, iconographic information or oral histories. Most importantly, mummified or skeletal human remains allow a rare glimpse into the internal health of an individual, to whom we can often ascribe age, gender, status and ethnic affiliation. On a small scale, this provides the historian with a wealth of information on an individual member of a past population, while allowing for comparative research between households, classes and ethnic groups on a larger scale. Eggs of the roundworms *Trichuris trichiura* and *Ascaris lumbricoides*, as well eggs from the tapeworm *Diphllobothrium latum* recovered from the bog mummies of the Drobintz Girl (600BC) and Karwinden Man (AD 500) excavated in the Polish Lakeland, or the former East Prussia[134], illustrate this point. The species and proportions of parasite ova recovered from these bodies corresponded to the proportions of parasite burden suffered by a rural population in that same area in the late 1930s, demonstrating the persistence of parasitic disease over time.[135]

Conclusion

The review of the archaeoparasitological and palaeopathological literature has revealed an interesting commonality between the studies. While the authors provide excellent detail regarding the methodologies used and data recovered, there is limited discussion that gives the data meaning within a broader historical

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[133] Capasso, Luigi "Correspondence: 5300 years ago, the Ice Man used natural laxatives and antibiotics", *The Lancet*, 352 (9143) (December 5, 1998), pg. 1864.
[134] Horne, " A Review of Human Endoparasitism in the pre-Columbian New World Through the Study of Coprolites", p. 301. And Pike and Biddle, (1966), p. 293.

context. Charles Faulkner's article is typical of the way in which the data are treated. "Prehistoric Diet and Parasitic Infection in Tennessee: Evidence from the Analysis of Desiccated Human Palaeofeces"[136] is heavy on the technical aspects of archaeological methods, lab techniques and identification, but light on the interpretation. For example, Faulkner can detail the use of immunoflourescent assay (IFA) to detect the presence of *Giardia liamblia*, commonly called 'beaver fever' in his samples, and still not mention that this contradicts the idea that *Giardia* was an introduced disease.

The greatest problem with physical data, a problem that overshadows those of sampling, recovery and contamination – is the quest to give it meaning. Ann Ramenofsky, for instance, devotes one hundred and seventy-two pages of her text to theorizing about the numbers of aboriginal peoples that probably died as a result of introduced disease, but dedicates a mere four pages to "Implications and Conclusions".[137] These studies provide much information about the physical impacts, but little about the social and cultural impacts of disease on aboriginal populations. As already noted, the sole result of combining archaeological, physical anthropological and historical data is, frankly, more data. This points the way to an obvious role for the historian — to give meaning to the physical data recovered by archaeologists and anthropologists. The following chapter will suggest directions that studies in disease history may take in order to provide a meaningful interdisciplinary analysis of illness.

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[135] Jones, "Human Parasite Remain: Prospects for a Quantitative Approach" (1982), p. 66.
[136] Charles Faulkner, "Prehistoric Diet and Parasitic Infection in Tennessee: Evidence from the Analysis of Desiccated Human Palaeofeces", *American Antiquity*, 56(4) (1991), pp. 687-700.

Chapter Four
Healing Disease History

According to Jardine and Spary, there is no 'natural' conception of nature.[138] This being the case, all meaning is derived from interpretation. In the case of disease history, this means that the acquisition of data is not enough – the researcher must give meaning to it in order for it to have historical value. It is a fallacy to think that data alone will provide 'naturally' obvious answers. For example, archaeologists and anthropologists, when attempting to remove contemporary biases, tend to present a limited range of interpretation of the data. As Chapter Three has demonstrated, studies in these fields result in a large volume of published data, with very little attempt made to give the data meaning or to place it in a broader historical context. The archaeologists and anthropologists have been diligent in the recovery and collection of disease data but there remains a need for extended interpretation: without it data has limited value for historians.

Interpretation is the strength of the historian and this provides an opportunity a historian to make sense of the physical data. But this also presupposes that the historical community accepts that the study of disease lies within the domain of history and that physical data is seen as an acceptable form of information. Historians are to be encouraged, then, to make a mental paradigm shift, to accept data that are not traditional documentary records, and to learn to interpret the past from physical remains. By using the physical data collected by archaeologists and anthropologists, researchers will have access to a splendid store of raw materials from which to draw meaning.

For the historian to look beyond the documentary record there must be an advantage to doing so. The greatest benefit to using physical data in historical

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[137] Ramenofsky, *Vectors of Death*, pp. 173-176.

[138] Nick Jardine and Emma Spary, "The Nature of Cultural History" in N. Jardine, J.A. Secord and E. Spary (eds.) *Cultures of Natural History* (Cambridge: Cambridge University Press, 1996), p. 12.

enquiry is that it will enable researchers to both identify conceptual blindspots and to reexamine the received interpretations. There should be no doubt that the most prominent received interpretation — that aboriginal peoples were free of disease in the pre-Columbian New World — is entirely incorrect. Without the use of physical data, this belief would be allowed to persist. The ability to correct these errors justifies using data sets that historians have traditionally overlooked.

The question that follows is how the historian may give meaning to archaeological or anthropological information and to incorporate physical data in historical enquiry. Perhaps this is the wrong way to look at the problem. Rather than attempting to give meaning to the data, the historian might wish to allow the physical data to give meaning to the history. This is not to say that the data has obvious meaning, but that a natural object can be "a universal and stable foundation for the transitory and speculative system [of history]"[139] Thus, the physical data has a reality that transcends historical narratives. Syphilis lesions on crania are physical evidence of syphilis regardless of how one may argue against it. In this way, there is a physical reality to archaeological and anthropological data that requires no interpretation other than the identification of the disease.[140] But it is not enough to identify disease — the data must be placed in a broader historical context to truly give it meaning.

The questions asked of the data by archaeologists and physical anthropologists are not always the ones that historians want answered. For instance, more work is done in these fields on the effects of disease upon an individual, while historians may be more interested in the effects upon a population. This is not an insurmountable problem. With enough data, disease can be studied at a population level. More difficulty arises because archaeologists and anthropologists typically are more interested in the physical effects of disease, while historians are more

[139] Jardine and Spary, "The Nature of Cultural History" (1996), p. 3.

concerned with its social and cultural impacts. But this is an arbitrary division and one that can be overcome. Historians must become conversant in the biological and physical language of disease before they attempt to find cultural meaning. This does not require that the historian become expert in the biosciences, only that a sincere effort should be made to understand the physical data before drawing social interpretations from it. Knowledge may be gained from a literature review, as seen in Chapter Three, and from consultation with social and biological scientists. Faculty and graduate students in departments of anthropology and archaeology at academic institutions are excellent sources of information. Scholars in the biological and medical sciences have been thrilled to help a historian to understand their data sets. These researchers, generally tied to short term and contemporary studies, are fascinated by the ability of historians to extend the depth of time studied and they enjoy finding examples in the past of diseases that they study in the present.

Consultation with professionals in these fields can enable the historian to gain a basic and working knowledge of the biological characteristics of disease and of the ways in which these diseases are expressed in the archaeological record or in human remains. Medical professionals can also indicate the potential effects of these diseases in a living person. This can help the historian to understand what really happened to individuals who had smallpox, malaria or any other disease under study. It makes little sense to speak of disease without some understanding of what the disease actually could and probably did do to the people being referred to. The historian should know, for example, that a heavy infection of *Trichuris trichiura* parasites renders their host malnourished and anemic, or at least iron deficient, while a severe worm burden can lead to a rectal prolaspe and even to the death of children.[141] In the case of the 'Ice Man', research conducted

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[140] This is one note of concern for the historian – since historians are likely not the ones to be analyzing the physical remains, they must rely upon the skill and judgment of other researchers in the determination of the type of disease represented in archaeological materials or human remains.
[141] Horne, " A Review of Human Endoparasitism in the pre-Columbian New World Through the Study of Coprolites", p. 301.

by Horst Aspoeck revealed the presence of *Trichuris* ova in the mummy's intestines. Luigi Capasso, a specialist in the diseases of prehistoric humans, also noted a pattern of underdevelopment of the mummy's fingernails and an abnormally low iron content in the mummy's skeletal muscles. Both of these conditions are consistent with the symptoms of anemia, a common result of the *Trichuris* infection.[142] Anemia and pain probably plagued the Ice Man in his last days. From the evidence, Capasso noted that "the man had recurrent generalized stress at roughly 30-day intervals during the last phase of his life."[143] Information such as this will give the researcher a better idea of what a *Trichuris trichiura* egg recovered from archaeological contexts may represent. This enriches the interpretive potential of the data, and has great implications for our understanding of the life and condition of the human individual involved.

With a basic understanding of the biology of disease and an awareness of how physical data is recovered, the historian is able to use this evidence in historical enquiry. First, the historian must find the data that fits the time and space delineated by their research directions. A review of the literature, and this should include the journals dedicated to archaeological and physical anthropological field science in particular, is the best place to start. Historians can find studies conducted in their area of research and from these find records of physical evidence of disease recovered in those field studies. As noted above, the physical evidence of disease is usually presented as raw data, often presented in tabular form, with little interpretation made from it. In his review of archaeological evidence of disease in the New World, Patrick Horne criticizes social scientists for relegating this data to footnotes and appendices.[144] This statement reveals how disease data can be presented as freestanding, meaningful fact when, in truth, it requires interpretation for meaning to be derived from it. This is where the historian can make the most meaningful contribution to disease history.

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[142] Capasso, "Correspondence", *The Lancet*, 352 (9143) (1998), p. 1864.
[143] *Ibid.*, p. 1864.
[144] Horne, " A Review of Human Endoparasitism in the pre-Columbian New World

Once the historian has acquired raw physical data of disease, it is prudent to again consult with archaeologists of physical anthropologists about the methodologies used in the collection and analysis of that information. These methodologies are usually clearly described in the scientific journals. A social scientist is helpful in critiquing the methods used, so that the historian will not end up using data that is poorly collected or of questionable origin or date. Just as there are histories that are badly done, there are dubious archaeological and anthropological studies. Consultation with respected scholars in these fields will assist the historian to recognize flaws and to avoid ambiguous data that could undermine the historian's work.

With confidence in the data, the historian can then seek advice from professionals who specialize in the particular disease being examined. These professionals can assist the historian to understand the physical data and the biological ramifications of this evidence. Medical researchers are, of course, logical persons to fill this role, but the historian might also want to consider referring to biologists for assistance. These scientists are especially good in helping the historian to understand the biology of disease transmission through intermediate and paratenic hosts, and zoonoses transmitted by animals. The result will be that the historian will acquire more knowledge of the etiology and epidemiology of the specific disease under study. Now, with an increased understanding of how the disease is biologically transmitted, the historian can make more meaningful estimations of the effects of disease upon individuals and communities.

Combining this understanding of the physical characteristics of disease with knowledge of social and cultural practices of the peoples studied, the historian will be better equipped to interpret the causes and impacts of disease. For instance, by knowing the ways in which pinworm is transmitted through close

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Through the Study of Coprolites", p. 308.

contact and poor sanitation, a fur trade historian can consider ways in which the cultural practices of fur trade posts may have contributed to the spread of this disease. Large numbers of individuals sharing close quarters, with little social incentive for cleanliness and proper sanitary practices, makes the ideal breeding ground for this common parasitic disease. Pinworm leads a simple and direct lifecycle that contributes to the high infection rate in modern populations. (The Center for Disease Control in Atlanta estimates that 50% of school aged children have this disease, with large numbers of prison inmates and other institutionalized people also being host to this parasite).[145] A fur trade post shares many similarities with institutions where pinworm is found, leading one to consider that the disease may well have been present at these types of sites also. Consulting the literature of archaeological and anthropological studies conducted at these sites can help to the historian to support this hypothesis with physical evidence of the disease.

Still, the question remains: aside from including physical evidence of disease in historical studies, how can the historian give this data meaning? Historians pride themselves in their interpretation of words and on the selection of information to create meaning. By using physical information, the historian has a greater pool of resources from which to draw meaning. It does not take a major leap of faith to interpret objects rather than words. In fact, it may actually be easier, as there are often fewer cultural or social variables to contend with. While there is no formula for interpreting physical data, there are a few suggestions that historians should keep in mind. First, as pointed out above, physical data is not infallible. Errors may be made in the collection and lab analysis of these remains. Consultation with appropriate specialists should help to offset this problem. In the case of data recovered from soils and coprolites, care must be taken to ensure that samples are definitely of human origin. As was noted in Chapter Three, different species are often host to similar ailments, and the identification of these different diseases is

[145] Center for Disease Control Website (1999) - http://www.cdc.gov/ncidod/dpd/parasites/pinworm/

often difficult. Furthermore, contamination of samples and cases of false parasitism are issues that the both the initial researcher and the historian who uses this data must be aware of. Taking these problems into consideration, the historian is left with valuable material from which to draw meaning. The most immediate task that the historian is faced with is correcting misconceptions and faulty interpretations in the current historiography.

Future Directions for Research

This thesis has identified a number of blank spaces in our knowledge of the disease history of aboriginal peoples, and from this several directions for future research can be suggested. First and foremost, a discussion of the impact of disease must be foregrounded in aboriginal history. While historians have attempted to do this, they have not been thorough in using all available data. Physical data are needed to round out the picture of disease in past populations. Without this empirical evidence, historians are making judgements based on perceptions and thoughts about illness. This is a facet of understanding illness, but to understand disease the use of physical information is mandatory.

One of the most important consequences of the use of archaeological and physical anthropological sources would be the testing of the accuracy of documentary data against physical data. Where the documentary record refers to smallpox epidemics, the physical record may have evidence of measles. While it is not possible at this time to find physical evidence of these two viral diseases in past samples, advances are being made which may result in the evidence of these types of diseases being recovered from archaeological and anthropological contexts. The extraction of human immunoglobulins from skeletal materials suggests the possibility of identifying human antibodies to viral infections, and the potential for the recovery of DNA from skeleton and mummified human remains also leads

to the potential recovery of the DNA of infectious diseases left there.[146] While many of these diseases are not currently identifiable from physical remains, enough data exists to draw conclusions about many of the disease suffered by pre- and post-contact aboriginal peoples.

There is not, in the field of disease history, a thorough understanding of aboriginal beliefs regarding illness. This is another area where interdisciplinary research should be focused. By noting the important role of healers in aboriginal society, ethnographic data and oral testimony support the physical evidence by indirectly relating the presence of disease in pre-contact cultures. Healers have a long and valued tradition of treating both physical and mental illnesses, and the role of these individuals has been of paramount importance to aboriginal communities and cultures from time immemorial. Through the use of plant remedies and contact with the spirit world, healers provided both physical and emotional care to the sick. Bruce Trigger noted that the traditions of health care and belief systems regarding illness imply a longstanding acquaintance with disease.[147] To claim that aboriginal peoples had no experience with disease, then, is to discredit and devalue the healer, and to contradict documentary, oral and ethnographic data that testifies to the importance of these individuals within aboriginal cultures. Rather as Native historiography calls for two sides to the story of Canadian history, there should be two voices in aboriginal disease history – those derived from the study of words and the study of physical remains.

A further direction suggested by this research is the investigation of culture-contact zones. Disease history is about connectedness – the natural connection between viruses, bacteria, protozoa, parasites and humans, physical connections between the Old and New Worlds, and cultural contacts between aboriginal peoples and Europeans. To fully understand culture-contact zones, a discussion of

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[146] Donald J. Ortner, "Skeletal Palaeopathology: Probabilities, Possibilities and Impossibilities" in Verano and Ubelaker (eds.) *Disease and Demography in the Americas* (Washington and London: Smithsonian Institution Press, 1992), pp. 5-6.

disease must be made (and *vice versa*). Realistically, one can not be understood independent of the other. More is needed in this area to gain a better knowledge of the effects of disease across physical and social boundaries, and to understand the impacts of disease upon the cultures there.

This case study of parasites and the disease history of New World aboriginal peoples are only examples, and these just scratch the surface of the subject. The intention of this thesis is to demonstrate the type of research that can be done if historians use physical data. Just as disease affected all areas of life — political, economic, social — so too should the discussion of disease be available for all areas of historical study. This thesis has argued that the use of biological data, in the form of archaeological and physical anthropological information, may aid the historian in the construction of the disease history of New World aboriginal peoples. But this is only one example. All historians attempting studies of disease history must turn to the information found in physical data sets. If the historian is able first to gain an understanding of the biological characteristics of disease, and then to use physical evidence recovered from archaeological and physical anthropological contexts, the result will be an integrated, holistic analysis of disease. Ultimately, this will help to shed light on issues previously considered outside of the domain of history which were, and remain, an integral part of the human experience.

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[147] See Trigger, pages 28 - 29 of this thesis.

BIBLIOGRAPHY

BAKER, BRENDA J. AND GEORGE J. ARMELAGOS. "The Origin and Antiquity of Syphilis", in Kiple and Beck (eds.) *Biological Consequences of the European Expansion, 1450-1800*. Aldershot, Great Britain: Ashgate Publishing. 1997.

BOYD, ROBERT. *The Coming of the Spirit of Pestilence: Introduced Infectious Disease and Population Decline among Northwest Coast Indians, 1774-1874*. Vancouver: UBC Press. 1999.

BRAVO, MICHAEL. "Ethnological Encounters" in N. Jardine, J.A. Secord and E. Spary (eds.) *Cultures of Natural History*. Cambridge: Cambridge University Press. 1996

BROWN, HAROLD W. et al. *Basic Clinical Parasitology*, Fourth Edition, New York: Prentice Hall. 1975.

BROWN, JENNIFER. *Strangers in Blood: Fur Trade Company Families in Indian Country*.Vancouver: University of British Columbia Press. 1980.

BUTTERFIELD, HERBERT. The Whig Interpretation of History. London: Bell Publishing. 1931

COLLINGWOOD, R.G. *An Autobiography*. London: Oxford University Press. 1939.

CREIGHTON, DONALD. *Empire of the St. Lawrence*. Toronto: Macmillian Company of Canada. 1956.

CROSBY, ALFRED W. "Weeds" in Crosby (ed.) *Ecological Imperialism: The Biological Expansion of Europe, 900-1900*. Cambridge: Cambridge University Press. 1986.

DESOWITZ, ROBERT S. *New Guinea Tapeworms and Jewish Grandmothers: Tales of Parasites and People*. New York: W.W. Norton. 1987.

DICKASON, OLIVE. *Canada's First Nations*, Toronto: McClelland and Stewart. 1992.

EVERETT, CLAIRE. *A Tale of Two Privies: Techniques for the Recovery of Organic Remains from Australian Latrine Deposits*. Unpublished BA Honours Paper, on file at the Department of Prehistoric and Historical Archaeology, University of Sydney, Australia. 1994.

FARLEY, JOHN. "Parasites and the Germ Theory of Disease" in Charles Rosenberg and Janet Golden (eds.) *Framing Disease: Studies in Cultural History*. New Brunswick, New Jersey: Rutgers University Press. 1992.

FAULKNER, CHARLES. "Prehistoric Diet and Parasitic Infection in Tennessee: Evidence from the Analysis of Desiccated Human Palaeofeces" *American Antiquity*, 56(4) (1991), pp. 687-700.

FUNSTON, SHELLY L.K. "An Examination of Samples from Site 1283T Gwaii Haanas National Park Reserve and Haida Heritage Site, For Evidence of Parasitic Disease." *Unpublished: Parks Canada* . On file at the Western Canada Service Centre. 1998.

GITLIN, JAY. "On the Boundaries of Empire: Connecting the West to Its Imperial Past", in William Cronon et al (eds.) *Under An Open Sky: Rethinking America's Western Past*. New York: W.W. Norton. 1992.

GOBBETT, BRIAN AND ROBERT IRWIN. *Introducing Canada: An Annotated Bibliography of Canadian History in English*. Lanham and London: Scarecrow Press. 1998

GOOCH, PETER S. "Helminth Parasites", in Gerald Hart (ed.) *Disease in Ancient Man*. Toronto: Clark Irwin. 1983.

HARSHBERGER, J.W. "The Purpose of Ethnobotany", *American Antiquity*, 17 (1896), pp. 73-81.

HORNE, PATRICK D. " A Review of Human Endoparasitism in the pre-Columbian New World Through the Study of Coprolites", *Journal of Archaeological Science*, 12 (1985), pp. 299-310.

HORNE, PATRICK D. AND JAMES A. TUCK. "Archaeoparasitology at a 17th Century Colonial Site in Newfoundland", *Journal of Parasitology*, 82(3) (1996), pp. 512-515.

INNIS, HAROLD. *The Fur Trade in Canada: An Introduction to Canadian Economic History* Toronto: University of Toronto Press. 1999 reprint.

JARCHO, S. *Palaeopathology*. New Haven and London: Yale University Press. 1966.

JARDINE, NICK AND EMMA SPARY. "The Nature of Cultural History" in N. Jardine, J.A. Secord and E.Spary (eds.) *Cultures of Natural History*. Cambridge: Cambridge University Press. 1996.

JONES, ANDREW K.G. "Human Parasite Remains: Prospects for a Quantitative Approach", in A.R. Hall (ed.) *Environmental Archaeology in the Urban Context*, Council for British Archaeology Research Report No. 43. 1982.

JONES, ANDREW K.G. "Trichurid Ova in Archaeological Deposits: Their Value as Indicators of Ancient Feces", in N.R.J. Fieller (ed.) *Palaeobiological Investigations: Research Design, Methods and Data Analysis*, Oxford: BAR International Series, 266. 1985.

KIDD, ROBERT S. *Fort George and the Early Fur Trade in Alberta*. Edmonton: Provincial Museum and Archives of Alberta Publication No. 2. 1970.

KRECH, SHEPARD III. "The Influence of Disease and the Fur Trade on Arctic Drainage Lowlands Dene, 1800-1850", *Journal of Anthropological Research*, 39 (1) (1983), pp. 123-146.

LOSEY, TIMOTHY. *Interim Report of the Fort George Excavations*. Unpublished: Provincial Museum of Alberta site report. 1978.

MCKAY, JOYCE. "The Coalescence of History and Archaeology", *Historical Archaeology*, 10 (1976), pp. 93-98.

MCELROY, ANN AND PATRICIA K. TOWNSEND. *Medical Anthropology in Ecological Perspective*. Boulder, Colorado: Westview Press. 1989.

MCNEILL, WILLIAM. *Plagues and People*. Garden City, New York: Anchor Press. 1975.

MOORE, PETER D. "Life seen from a medieval latrine", *Nature*, 294 (1981), pg. 614.

MORTON, ARTHUR. *History of the Canadian West to 1870-71*. Toronto: University of Toronto Press. 1939.

NIKIFORUK, ANDREW. *The Fourth Horseman: A Short History of Plagues, Scourges and Emerging Viruses*. Toronto: Penguin Books. 1991.

ORTNER, DONALD J. "Skeletal Palaeopathology: Probabilities, Possibilities and Impossibilities", in Verano and Ubelaker (eds.) *Disease and Demography in the Americas*, Washington and London: Smithsonian Institution Press. 1992.

ORTNER, D.J. AND W.G.J. PUTSCHAR. *Identification of Pathological Conditions in Human Skeletal Remains* Washington: Smithsonian Institution Press. 1981.

PIKE, A.W. AND M. BIDDLE. "Parasite eggs in medieval Winchester", Antiquity, 40 (1966), pp. 293-296

RAY, ARTHUR J. "Diffusion of Diseases in the Western Interior of Canada, 1930-1850", *Geographical Review*, 66(2) (1976), pp. 139-57.

RAY, ARTHUR J. *Indians in the Fur Trade: their role as trappers, hunters, and middlemen in the lands southwest of Hudson Bay, 1660-1870*. Toronto: University of Toronto Press. 1974.

RAY, ARTHUR J. *I Have Lived Here Since the World Began*. Toronto: Lester Publishing.1996.

REINHARD, K.J. "Archaeoparasitology in North America", *American Journal of Physical Anthropology*, 82 (1990), pp. 145-163

RICH, E.E. *The Fur Trade and the Northwest to 1857*. Toronto: McClelland and Stewart Limited. 1967.

ROBERTS, CHARLOTTE AND KEITH MANCHESTER. *The Archaeology of Disease*, Second Edition. Ithaca, New York: Cornell University Press. 1997.

SAID, EDWARD. *Culture and Imperialism*. New York: Random House. 1992.

SAVITT, TODD L. *Medicine and Slavery: The Disease and Health Care of Blacks in Antebellum Virginia*. Urbana: University of Illinois Press. 1978.

SIOUI, GEORGES. *For An Amerindian Autohistory: an essay on the foundations of a social ethic*. Foreword by Bruce Trigger. Montreal: McGill-Queen's University Press. 1992.

STODDER, ANN L.W. AND DEBRA L. MARTIN. "Health and Disease in the Southwest before and after Spanish Contact", in Verano and Ubelaker (eds.) *Disease and Demography in the Americas*. Washington: Smithsonian Institution Press. 1992.

TRIGGER, BRUCE. *Natives and Newcomers: Canada's 'Heroic Age' Reconsidered*. Kingston and Montreal: McGill – Queens University Press. 1985.

VAN KIRK, SYLVIA. *Many Tender Ties: Women in Fur Trade Society, 1670-1870*. Winnipeg: Watson and Dwyer Printing. 1980.

VERANO, JOHN W. AND DOUGLAS H. UBELAKER. "Introduction", in Verano and Ubelaker (eds.) *Disease and Demography in the Americas*. Washington: Smithsonian Institution Press. 1991.

WATT, SHELDON. *Epidemics and History: Disease, Power and Imperialism*. New Haven and London: Yale University Press. 1997.

WEAR, ANDREW. *Medicine in Society: Historical Essays*. Cambridge: Cambridge University Press. 1992.

WHITE, RICHARD. *The Middle Ground: Indians, empires and republics in the Great Lakes region, 1650-1815*. Cambridge: Cambridge University Press. 1991.

WILLIAMS, J.A. "Evidence of hydatid disease in a Plains Woodland burial", *Plains Anthropologist*, 30 (1985), pp. 25-28.

ZIMMERMAN, M.R. "Aleutian and Alaskan Mummies", in A. Cockburn and E. Cockburn (eds.) *Mummies, Disease, and Ancient Cultures*. Cambridge: Cambridge University Press. 1980.

ZIMMERMAN, M.R. AND A.C. AUFDERHEIDE, "The frozen family of Utqiagvik: The autopsy findings", *Arctic Anthropologist*, 21 (1984), pp. 53-64.

ZINSSER, HANS. *Rats, Lice and History*. Boston: Little, Brown and Company. 1945.

Appendix "A"
Lab Methods

....if you have a specific project in mind for the privy – God only knows what that would be - ....[148]

As noted in Chapter Three of this thesis, archaeological privy features have been proven to contain the ova and remains of human parasites. To determine how these materials may be recovered, soil samples from potential privy features were collected May 23, 1996 at Fort George and Buckingham House Historic site, near Elk Point, Alberta. Specifically, the samples were collected from features on the Fort George site, a Northwest Company fur trading post occupied from 1792-1800. This site was selected based on the fact that features had been uncovered during archaeological excavations in the 1978 that seemed to indicate the presence of outhouse remains.[149] To conduct this study, Heinz W. Pyszczyk of the Department of Archaeology and Ethnology, Provincial Museum of Alberta obtained a permit to collect soils from the site.[150] All field work was carried out by Dr. Pyszczyk and myself under the authority of this permit.

Dr. Pyszczyk and I surveyed the site from an established datum point, and located our area of study based on site maps of Timothy Losey's 1978 excavations that suggested privy features may be found behind the excavated men's quarters.[151] A test area was selected by shooting in a baseline with surveying equipment, and measuring from that baseline according to Losey's site map. At this spot, we chose to use a soil auger to remove small amount of soil in an expedient manner, rather than fully excavate the area. Using the soil auger, I collected two sets of

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[148] Heinz Pyszczyk, Personal Communication. May, 1995. A comment in jest from the distinguished doctor.
[149] Timothy Losey. *Interim Report of the Fort George Excavations* (Unpublished: Provincial Museum of Alberta site report, 1978), p. 44.
[150] While regulations vary from province to province, a provincial government permit generally must be held by an approved archaeologist to conduct field studies. This archaeologist must be present on the site at all times to ensure that the field work follows set standards.
[151] Losey. *Interim Report of the Fort George Excavations* (Unpublished: Provincial Museum of Alberta site report, 1978), p. 44.

samples from the area. Initially, the area suspected did not produce likely samples. The soil was loose, light coloured sand, whereas the archaeological reports had described dark organic soil. We tested the area around our surveyed point and found the dark organic soil reported by Losey approximately half a meter west of the original point.

Two further samples were taken from this second point. The description of the matrix fit Losey's description of the area that he suspected to be privies. The 1976 excavations had revealed features that contained dark, organic soils and artifactual materials, such as bone and glass. These materials are consistent with the types of materials found in privies, which are often used for general refuse disposal. Additionally, two samples were taken from outside the known fort boundary, and one from another area within the fort boundary. These samples were intended to function as a 'control', to determine whether there was a 'background' level of human parasite remains in the soil, that might not be specific to the occupation of the fur trade post.

All samples taken were drawn from approximately two feet below the surface. At this depth, the soil displayed a dark organic band indicating the occupation layer of the post. Both above and below this depth, the soil was found to be light-coloured sand. Each sample was drawn up with the soil auger, and the dark organic portion was separated from the topsoil and placed in a ziploc bag for storage. Each sample was labeled with the provenience in waterproof ink. The auger and trowel used to separate the samples were washed thoroughly with water between samples to prevent cross-contamination between samples.

Samples from suspected privies were also obtained for sites FfQh–2 and FfQh-6, two 1920s era logging camps, from the archaeological consulting firm Fedirchuk, McCullough and Associates.[152] As part of salvage operations on the Cheviot

[152] Barbara Kulle, Personal Communication, February 5, 1997.

Mines lease lands near Hinton, Alberta, samples were excavated from small square depressions, believed to be outhouses, on the two sites.

All samples collected from the three sites were taken to the Palaeoenvironmental Research Lab at the Provincial museum of Alberta, and stored in their refrigeration unit until lab work commenced February 1997.

Sampling Techniques

To assess the presence or absence of parasite ova in archaeological samples from Fort George and the archaeological sites on the Cheviot lease lands, Charles Faulkner of the Department of Clinical Parasitiology, University of Tennessee at Knoxville supplied the author with a number of sources for suitable lab methodologies. Faulkner had generally recovered parasite remains from desiccated stools, or coprolites. Working with soil samples presented further challenges. He perceived the need for added processing of soil samples, and provided reference material that was directed at sampling from soils.[153] These techniques are described below.

Disaggregation

The recommended technique for processing soil samples involves breaking down the soil using the Sodium Hypochlorite Recovery Technique, which is recommened to break down the soil. [154] An easily obtained form of sodium hypochlorite is household bleach, which contains approximately 7% sodium hypochlorite.

For each volume of soil, a volumes of bleach solution, consisting of 3 parts bleach to 10 parts distilled water, is used to hydrate and breakdown the sample. 10-20

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[153] Most useful was Claire Everett, *A Tale of Two Privies: Techniques for the Recovery of Organic Remains from Australian Latrine Deposits* (Unpublished: Honours paper on file , Department of Prehistoric and Historic Archaeology, University of Sydney, 1994)

[154] Everett, *A Tale of Two Privies* (1994), p. 30 –32.

volumes of water are added, the components mixed, and the suspension allowed to sediment for one-two hours. After draining the supernatant, the remaining suspension is passed through a large mesh sieve to remove coarse particles. The product of this procedure is left to sediment a further one to two hours. The remaining supernatant is discarded, and a zinc sulfate flotation performed on the sediment materials.

While the above technique has undoubtedly proven helpful in many cases where soil samples have been evaluated, it was deemed to be unnecessary for the purposes of this work. The materials from the three sites tested did not require additional break down; all samples tested disaggregated readily and distilled water proved to be an adequate agent for breaking down the soils.

Concentration of Samples

The next step in the lab analysis was to concentrate any ova present in the samples. Concentration is done to separate parasite remains from the extraneous materials found in samples, such as other organic materials. Ash reports that concentration procedures, such as floatation or sedimentation, help to ensure the detection of small numbers of organisms from fecal samples. Concentration techniques have proven invaluable when processing soil samples.

Both sedimentation and floatation were considered as means of concentration for this study. Sedimentation is done through centrifugation of the sample, or through the use of simple gravity. The advantage of sedimentation is that the sedimented sample will generally contain all the parasite remains occurring in the sample. As well, it can be used on fresh or desiccated samples. [155] The disadvantage of this technique is that the resulting sample is much more difficult to examine due to the presence of other material that has also sedimented. This material is often so

[155] Everett, *A Tale of Two Privies* (1994), pp. 30 –32.

excessive that it often masks the presence of parasite remains. In that this study is experimental, it was decided that we would utilize both methods of concentration.

Sedimentation tests were conducted on the samples from all three sites. 30 ml of Formalin and 9ml of Ethyl Acetate were added to 5ml soil samples that had been wet sieved through a 90-micrometer mesh to remove debris. Materials that were collected on the 45-micrometer mesh were sedimented and tested for parasite ova. The sedimentation technique of concentration was successful in that materials were recovered, but too much debris was present, making examination very difficult. Preparations made from this technique were comprised mostly of sand, silt and organic debris. In considering this as a method for concentrating from soil remains, it was decided that the presence of both organic and inorganic materials in the soil made examination too time consuming and difficult to make the procedure feasible.

Floatation was discovered to be more expedient method of concentrating the samples, as it reduced the amount of extraneous material in the preparation. Floatation techniques rely upon the use of reagents that produce solutions that have a greater density than the parasite ova occurring in the samples.[156] Parasite cysts and eggs, even when present in small numbers in the sample, can usually be easily recovered and are readily seen in floatation prepared slides. An advantage of the floatation technique is that slides made from this procedure are cleaner and have less debris than those made from sedimentation concentrations. Protozoan cysts and most nematode eggs float readily, but if the specific gravity is not high enough it will prevent the heavier eggs of trematodes and many cestodes from floating, and being recovered.[157] This was not considered to be a problem, as I was primarily testing for the recovery of nematode ova.

[156] Everett, A Tale of Two Privies (1994), p. 28.
[157] *Ibid.*, p. 28

A disadvantage of the floatation method of concentration, and one which was seriously considered, is that since the suspending solution has a greater density than the parasite remains, cysts and the walls of eggs will often distort or collapse if left in the solution too long.[158] Distortion or collapse of the parasite remains would make identification difficult, if not impossible. Generally, preparations made from floatation should be examined within 10-20 minutes of being prepared to prevent distortion from the higher specific gravity solution. With the exception of the sugar-floatation carried out at the lab of Dr. Shostak, the samples prepared for this study were prepared in the Palaeoenvironmental research lab at the Provincial Museum of Alberta, and were examined at the University of Alberta. The time lag in getting the preparations from the Provincial Museum of Alberta to the lab of biologist Alan Shostak at the University of Alberta would have been greater than the time allowable before any ova present would be deformed or destroyed due to the high specific gravity of the solution. In order to prevent this problem, the methodology provided by Faulkner was adpated to reduce the specific gravity of the solution that the samples were stored in prior to analysis. The top 1 ml of the floatation samples were removed with a sterile pipette and placed in a vial with an equal volume of formalin. The addition of the formalin acted both as a fixative, and also reduced the specific gravity of the solution so as to prevent distortion of potential data.

Zinc Sulfate is the most widely used chemical in floatation concentration methods.[159] To prepare a solution with a specific gravity of 1.18, 165 grams of zinc sulfate (ZnSo4) crystals were added to 335 ml of distilled water. Slide preparations produced demonstrated that this technique was successful in recovering parasite ova from soil samples. However, there was still the problem of extraneous debris present in the floating material. Thus, a second method of floatation was tested for concentration from soil samples.

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[158] *Ibid.*, p. 29.
[159] *Ibid.*, p. 32.

A Sugar Floatation for the concentration of parasite remains was also carried out at the lab of Dr. Alan Shostak of the Department Biological Sciences, University of Alberta. Using the lab facilities at the University, sugar floatation was conducted on two soil samples. The solution for this test is a mixture of sugar, distilled water and phenol. This technique turned out to be the most successful in terms of material recovered, and also produced the cleanest slide preparations.

Results

While the remains of parasites were recovered using the above techniques, there was only one ovum that Dr. Shostak could identify as likely being that of a human parasite. Other parasites and ova recovered were those of plants, or organisms that naturally occur in soils. From the FfQh-2 site on the Cheviot lease lands, Dr. Shostak identified an ova of what appeared to be *Ascaris lumbricoides*.

The samples from Fort George contained no parasite remains, neither of human nor non-human parasites. This may be a result of the sandy soils present on the site, which might not be conducive to the preservation or collection of parasite remains.

Discussion

The samples taken from the Fort George site may not represent soils from a privy or latrine. The dark organic soil layer was at a depth of two feet, and this depth was quite uniform throughout the site. Below this depth, the matrix was a loose sandy soil. Generally, privies are dug deeper into the surrounding soils, and one would expect the dark organic soil to be more than just a layer, and continue deeper than two feet below the surface. I suspect that what Losey tentatively identified as privies might actually represent middens or refuse deposits behind the men's quarters. The fact that no parasite remains were found here does not mean that parasitic disease was not present at the site, only that it may not have been preserved, or was not present in the soils we sampled. More testing can be done on this site if privy features can be positively identified.

Positive results from the samples collected from sites FfQh-2 and FfQh-6 indicate that the lab methods used in this study are successful in the recovery of parasite remains from archaeological soils. While the parasites of plants were the most common form recovered, that there is potential for human parasite remains to be collected with these techniques was demonstrated by the recovery of an *Ascaris lumbricoides* ovum. While the presence of a single ovum is far from conclusive, it serves to demonstrate that the techniques outlined above may be used successfully by historians to collect physical evidence of disease.

Appendix "B"
Archaeological Evidence of Some Diseases in Pre-Columbian Aboriginal Populations

Disease	Place	Date	Reference
Tuberculosis	Black Mesa	875-975 BP	Ortner and Putschar[160]
"	Pueblo Bonita	900-1100 BP	"
Syphilis	Canyon de Chelly	900-1100 BP	Baker and Armelagos[161]
Bronchopneumonia	Southern Peru	2000 BC	Verano[162]
Anemia	Canyon de Chelly	300BC – AD700	Stodder and Martin[163]
Caries and Abscesses	Chaco Canyon	700-1300 AD	Stodder and Martin[164]

[160] D.J. Ortar and W.G.J. Putschar, *Identification of Pathological Conditions in Human Skeletal Remains* (Washington: Smithsonian Contributions to Anthropology 28, 1981)

[161] Brenda J. Baker and George J. Armelagos, "The Origin and Antiquity of Syphilis" in Kiple and Beck (eds.) *Biological Consequences of the European Expansion* (1997), p. 8-15.

[162] John W. Verano, "Prehistoric Disease and Demography in the Andes" in Verano and Ubelaker (eds.) *Disease and Demography in the Americas* (1992), p. 15. Also present in these autopsied mummies were symptoms lobar pneumonia. Verano notes that these two diseases were also present in mummified remains in northern Chile.

[163] Ann L.W. Stodder and Debra L. Martin, "Health and Disease in the Southwest before and after Spanish Contact" in Verano and Ubelaker (eds.) *Disease and Demography in the Americas* (1992), p. 58. Note – This sample (n=50) examined children 10 years of age and younger. 72% of these skeletons expressed symptoms of anemia, common in agrarian communities.

[164] Stodder and Martin, "Health and Disease in the Southwest before and after Spanish Contact" in Verano and Ubelaker (eds.) *Disease and Demography in the Americas* (1992), p. 57. In this sample, 85% of the skeletons examined had cavities or oral abscesses, another problem of carbohydrate-based diets found in maize-dependant cultures.